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A COMPREHENSIVE RAPID-ASSESSMENT-OF-FLUTTER / EJECTION-LOADS (RAFEL) SOFTWARE SYSTEM FOR AIRCRAFT / STORE COMPATIBILITY

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13. ABSTRACT (*Maximum 200 words*)

This report documents a design scheme for a rapid assessment of flutter and limit cycle oscillation of aircraft with multiple store configurations. Using the F-16A as a baseline aircraft, three different aeroelastic instability responses, including classical flutter, typical LCO, and non-typical LCO, have been successfully identified. These three distinct responses are representative of the broad spectrum of aeroelastic responses encountered by fighter aircraft with external stores. To rapidly compute the flutter prediction of the aircraft with multiple store configurations, a procedure is proposed to efficiently reuse the aerodynamic influence coefficient (AIC) matrices of aircraft with multiple stores. The procedure used the ZAERO code, that contains a unified aerodynamic module for all Mach numbers, as the basic software system. To discern the difference between the flutter and LCO responses, and to correlate the numerical predictions with the flight altitude, the matched point option of the g-method of ZAERO was used. The influence of the aerodynamic stores on the aeroelastic instability is investigated using a number of aerodynamic models, including the isolated wing-tip launcher model, and the whole aircraft with and without stores. Using a more refined aerodynamic model, the results show good agreement between the present numerical predictions and flight flutter test data, including the oscillation frequency and the onset speed of the three flutter and LCO cases.

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FOREWORD

This Phase I SBIR final technical report entitled "*A Comprehensive Rapid-Assessment-of-Flutter / Ejection-Loads (RAFEL) Software System for Aircraft / Store Compatibility*," has been prepared by ZONA Technology, Inc. (ZONA), under contract number FO 863501-C-0049, sponsored by The Department of The Air Force/Air Armament Center, Eglin Air Force Base, FL 32542. This report presents the findings as of January 16, 2002, from a research and development program begun April 16, 2001.

Mr. Ping-Chih Chen of ZONA was the Principal Investigator, Mr. E. Sulaeman and Dr. D.D. Liu of ZONA were co-principal investigators. Mr. Major Baron Canty and Dr. Charles M. Denegri Jr. of Eglin Air Force Base were the Government Technical Monitor. The author would like to thank Dr. Denegri for providing structural and aerodynamic data and for his valuable comments and suggestions throughout the course of this development.

This report documents the entire work under the Phase I effort. It is published for the dissemination of technical information. The findings and conclusions are those of the authors and do not necessarily represent the views of the United States Government. Distribution of this report shall be in accordance with the Distribution Statement of the Report Documentation page found on the cover hereof.

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ACRONYMS

AIC	Aerodynamic Influence Coefficient
ASE	Aeroservoelasticity
CFD	Computational Fluid Dynamics
CFL3D	High-level computational fluid dynamics code by NASA (Ref 19)
CPU	Computional Processing Unit
DLM	NASTRAN's code to generate steady/unsteady subsonic aerodynamics based on a doublet lattice method.
DMAP	Direct Matrix Abstraction Program
DMS	Data Mining System
FEM	Finite Element Model
GUI	Graphical User Interface
LCO	Limit Cycle Oscillation
MATLAB	Matrix Laboratory (An interactive system and programming language for general scientific and technical computation.)
MSM	Massive Store Management
NASTRAN	Structural FEM software product of MSC

PVM	Parallel Virtual Machine
RAFEL	Rapid Assessment of Flutter / Ejection Load
SDG	Store Database Generator
UAIC	Unified Aerodynamic Influence Coefficient
ZAERO	ZONA's aeroelasticity and unstable aerodynamic software system covering all Mach ranges including ZONA6, ZONA7, ZTAIC and ZONA7U for complex aircraft configuration with external stores (Ref 6-10)
ZDM	ZONA Dynamic Module
ZONA	ZONA Technology, Inc.
ZONA51	ZONA's code implemented in NASTRAN to generate steady/unsteady supersonic aerodynamics for complex aircraft configuration with external stores (Ref 4). Capable to handle only flat type configuration.
ZONA6	ZONA's code to generate steady/unsteady subsonic aerodynamics for complex aircraft configuration with external stores (Ref 6)
ZONA7	ZONA's code to generate steady/unsteady supersonic aerodynamics for complex aircraft configuration with external stores (Ref 7)
ZONA7U	ZONA's code to generate steady/unsteady unified hypersonic and supersonic aerodynamics for wing-body/aircraft configurations with external stores(Ref 8)
ZTAIC	ZONA's Transonic Aerodynamic Influence Coefficient code; Generates unsteady transonic aerodynamics for complex aircraft configuration (Ref 7)

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SECTION 1

INTRODUCTION

This final technical report describes the work performed by ZONA Technology, Inc. (ZONA) under an SBIR Phase I contract FO8635-01-C-0049, entitled "*A Comprehensive Rapid-Assessment-of-Flutter/ Ejection-Loads (RAFEL) Software System for Aircraft /Store Compatibility*".

The overall Phase I technical objective is to develop an accurate and computationally efficient software system for the aeroelastic solutions of massive number of aircraft/store configurations.

The F16 is selected as a baseline aircraft with the following specific objectives:

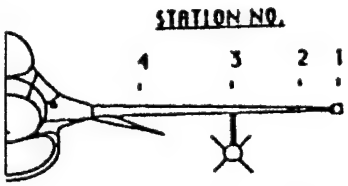
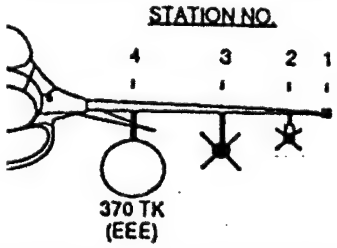
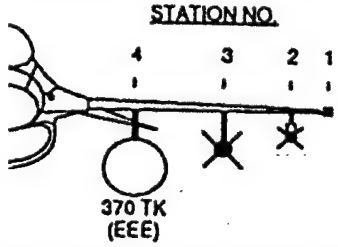
1. Investigate the accuracy of ZONA's Aeroelastic Software System (ZAERO) to predict aeroelastic instability of the F-16 aircraft with multiple stores for subsonic, transonic and supersonic Mach number.
2. Investigate the capability of ZAERO to differentiate various types of aircraft/store aeroelastic instability behavior including classical flutter, typical limit cycle oscillation (LCO) and non-typical LCO.
3. Validate the accuracy of ZAERO aeroelastic system with the flight test data of three proposed F-16/store configurations (Table 1.1).
4. Using ZAERO as the basic software system, design a *Massive Store Management (MSM)* system that can substantially increase the computational efficiency of ZAERO.

In this Phase I effort, we have accomplished the following:

- Performed aeroelastic instability computation using ZAERO for a number of F-16 aircraft in subsonic, transonic and supersonic flight regimes and at various altitudes.
- Investigated the influence of various store aerodynamic models including underwing/tip launchers, weapons and fuel tank aerodynamic model to the aeroelastic behavior of the whole aircraft/store configurations.
- Investigated the influence of aircraft rigid body modes to the aeroelastic instability of various aircraft/stores configurations.
- Investigated the capability of linear and nonlinear unsteady aerodynamic procedures of ZAERO to differentiate various aeroelastic instability behavior including classical flutter, typical limit cycle oscillation (LCO) and non-typical LCO of F-16 aircraft with multiple stores.
- Investigated the correlation between the flight test data of the three proposed F-16/store configurations and the aeroelastic response computed using ZAERO.
- Designed the Massive Store Management (MSM) system as a platform to the rapid aeroelastic prediction (RAFEL) scheme based on the ZAERO aeroelastic system for the assessment of flutter/LCO of massive aircraft/store configurations.

To validate the accuracy of the present procedure, three configurations of F-16A Block 15 given in Reference 1 are selected and shown in the following Table.

Table 1.1 F-16A Store Configurations.

Sta. No.	Aeroelastic Response Type		
	Case 1 Classical Flutter	**Case 2 Typical LCO**	**Case 3 Non-typical LCO**
1	LAU-129/A launcher	LAU-129/A launcher	16S210 launcher
2	Empty Station	LAU-129/A launcher AIM-9L missile	LAU-129/A launcher AIM-9L missile
3	Launcher/pylon Air-surface missile	Launcher/pylon Air-surface missile	Launcher/pylon AIM-120A missile
4	Empty Station	Pylon 370-gal fuel tank (empty)	Pylon 370-gal fuel tank (empty)
Front View	 Air-Surface Missile		

1.1 Background

Flutter clearance of a modern fighter aircraft with massive store/weapon configuration is a major engineering task in aircraft/store weapon compatibility. This task requires expedient and yet accurate solutions in a short-time framed demanded by rapid military responses when facing today's ever-changing international situation. Since there can be more than 400,000 store/weapon combinations for a typical fighter aircraft, the flutter clearance for such configuration requires not only the solution accuracy but also computational efficiency to rapidly identify the critical cases. The procedure is needed also to identify a wide variety of aeroelastic response characteristics including flutter, divergence and limit cycle oscillation.

1.2 Limit Cycle Oscillation (LCO) of Wing with External Stores

Limit Cycle Oscillation (LCO) has been a persistent problem on several current fighter aircrafts and is generally encountered with external store configurations. Denegri (Ref 2) provided a detailed description of the aircraft/store LCO phenomenon. Norton (Ref 3) gave an excellent overview of LCO of fighter aircraft carrying external stores and its sensitivity to store carriage configuration and mass properties.

LCO can be characterized as sustained periodic oscillations which neither increase nor decrease in amplitude over time for a given flight condition. Using a refined aerodynamic model of the aircraft and stores, ZONA (Chen, Sarhaddi and Liu – Ref 4) has shown that wing/store LCO is a post-flutter phenomenon whenever the flutter mode contains low unstable damping. This type of flutter mode is called "*hump mode*". Since the aircraft structure usually contains structural nonlinearity such as friction damping, this amplitude-dependent friction damping can stop the growth of amplitude (due to flutter), thus the structural system would result in steady-state oscillation. This is known as LCO. By contrast, a typical flutter mode is a result of growth of amplitude largely due to destabilizing negative aerodynamic damping, hence a drastic increase in damping beyond the neutral stability point, or the flutter point (g = 0). A typical flutter mode and hump mode are shown in Figure 1.1.

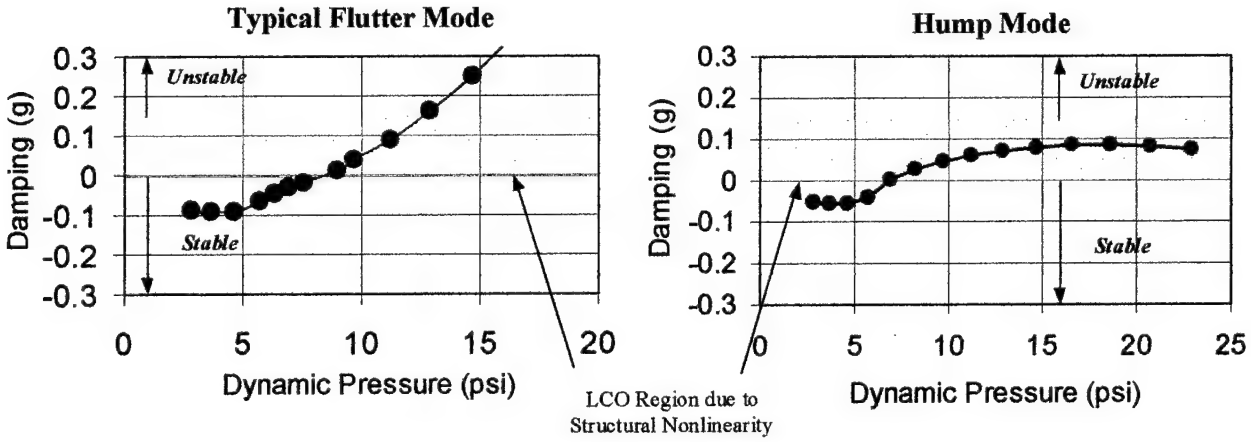


Figure 1.1 Typical Flutter Mode and Hump Mode by Flutter Analysis

Admitting nonlinear friction damping, Denegri (Ref 5) also showed consistent trends that hump mode can be used to correlate the flutter solutions with LCO flight test data of F-16's. Since the structural characteristic varies for different aircraft/store configurations, it is unlikely that the fixed-gain type of control system would work for wing/store LCO suppression in general. It appears that an adaptive controller with an online system identification process would be most appropriate for LCO suppression of a wide range of aircraft/store configurations.

1.3 Technical Issues and Challenges

Rapid assessment of flutter/LCO of aircraft with multiple stores presents challenging problems to be resolved. Several pertinent technical issues are addressed as follows.

- *Solution Accuracy Including Algorithm Robustness, Modeling Fidelity, and Extended Flight Regimes*

  Current engineering analysis enjoys sufficient accuracy provided by the structural finite element (FEM) methodology. But a compatible level of accuracy provided by unsteady

aerodynamics for flutter/ejection loads is lacking. This calls for an unsteady aerodynamic method that can deal with complex configurations such as a whole aircraft with external stores in all flight regimes including subsonic, transonic and supersonic Mach numbers, and with sufficient solution accuracy.

- *Computational Efficiency for Massive Store/Aircraft Combinations*

  CFD has become an accurate tool for aerodynamic analysis/design. Recognized by experienced aeroelasticians, however, unsteady CFD is far from being an efficient tool for aircraft aeroelastic analysis, let alone for the massive store/aircraft aeroelastic requirement. Using the CFL3D code (Ref 2), ZONA's recent study shows that it requires 4 days of computing time to complete a transonic LCO study on a 1 GHz computer of a two-dimensional (2-D) airfoil (Ref 3). The requirement to process 2000 flutter configurations in two weeks is a stringent one. Since unsteady CFD is out of the question, one resorts to the well-practiced unsteady-aerodynamics computational procedure called AIC (Aerodynamic Influence Coefficient) matrix. The merit of AIC matrix is that it will provide the corresponding unsteady aerodynamics (in frequency domain) to a fixed aerodynamic configuration, but can couple with alternative structural arrangements. The AIC, and hence the unsteady aerodynamics, is computed once and for all and can be re-used for repetitive aeroelastic computations. For slightly different aerodynamic configurations such as the same aircraft with different stores, only a small subset (sub-matrix) of the AIC matrix needs to be regenerated.

- *Rapid Selection for Critical Flutter, LCO and Ejection Loads*

  This calls for an automated *data mining system* that can search for and identify the critical flutter, LCO and ejection loads through the data set generated by massive flutter/ejection load analyses. In addition, this data mining system must be able to recognize an LCO case from the flutter-solution cases, to identify the severity of the flutter instability, to compute the sensitivity of the flutter/LCO to the change of flight speed, and to provide recommendations regarding the need of additional flight test to confirm the software predictions.

1.4. Overall Design Strategy

It appears that the newly released ZAERO aeroelastic software system is a viable methodology to answer all the above technical challenges. ZAERO is a comprehensive aeroelastic software system which contains over a dozen modules for arbitrary aircraft configurations with complex store/weapon combination. Application of ZAERO for the rapid assessment of the aircraft/store aeroelastic instability can be constructed based on the following two parts:

- *The off-line analysis.* In this stage, the most time consuming computation of the unsteady aerodynamic and structural finite element data base of the aircraft/store are generated. Only the portion invariant to the changes in the store configuration is generated. For a typical flutter calculation of the aircraft/store, the invariant portion of the aerodynamic data base can be as large as 95% ~ 99% of the total aerodynamic data required. This off-line analysis stage

can be performed independent of any store configuration. The generation of the database in the off line analysis clearly will reduce the computational time significantly.

- *The on-line analysis*. In this stage only small portion of the calculation is needed to generate the aerodynamic data associated with the variation of the store configurations.

1.5 Required Software Tools

Two engineering disciplines in terms of software tools are employed for the present study, namely MSC/NASTRAN and ZAERO. MSC/NASTRAN is used to perform the structural finite element (FEM) analysis and to generate the generalized mass and stiffness matrices as well as mode shapes of the aircraft structure. ZAERO is ZONA's commercialized aeroelastic software system that integrates the essential disciplines required by aeroelastic and aeroservoelastic design/analysis.

SECTION 2

COMPREHENSIVE RAPID-ASSESSMENT-OF-FLUTTER/EJECTION-LOADS (RAFEL) SOFTWARE SYSTEM

The RAFEL software system consists of three sub-systems: an invariant unified aerodynamic influence coefficient (UAIC) submatrix generation system, a Massive Store Management (MSM) system, and a data mining system. The core of the RAFEL system is the ZAERO aeroelastic system which is used as a tool to generate the AIC matrix and solve the aeroelastic system of equations. A detailed description of ZAERO is presented first in the next section, followed by the application of ZAERO in the RAFEL system.

2.1 ZAERO – An Engineer's Toolkit for Aeroelastic Solutions

ZAERO is ZONA's aeroelastic software system that integrates the essential disciplines required by aeroelastic and aeroservoelastic design/analysis (Ref 17). Figure 2.1 illustrates six essential modules in ZAERO that consist of five engineering modules namely the Unified AIC (UAIC), 3-D spline, flutter, aeroservoelasticity (ASE) and transient loads modules and a memory and database management system called the ZDM module.

The functionality of the ZDM (ZONA Dynamic Memory and Database Management System) module is equivalent to the DMAP/GINO system of MSC/NASTRAN. The entire ZAERO program architecture is developed based on the ZDM module that controls the input/output data entities of all engineering modules. The ZDM module will also serve as a basic database system for the development of the proposed massive-store management system. Throughout the years, all of the ZAERO modules have been continuously validated by many test cases ranging from the verification with exact solutions for simple geometries to the comparison with experimental or CFD data for complex configurations. The main features of these five modules now follow.

The UAIC Module

The UAIC module shown in Figure 2.1 consists of four unsteady aerodynamic methods, namely ZONA6, ZTAIC, ZONA7 and ZONA7U, which jointly provide a Unified Aerodynamic Influence Coefficient (UAIC) matrix covering all Mach numbers for complex aircraft/store configurations. By contrast, MSC/NASTRAN contains only the DLM method for subsonic flows and the ZONA51 method for supersonic flow and can only handle flat-plate type configurations. Note that ZONA51 method (Ref 4) in MSC/NASTRAN is a ZONA software product for supersonic lifting surface unsteady aerodynamics that has been integrated into the aeroelastic option of MSC/NASTRAN since 1990. Today, ZONA51 has become the industrial standard method for supersonic lifting surface unsteady aerodynamics with over 120 users worldwide. The features of these four unsteady aerodynamic methods in the UAIC module are:

- ZONA6 (Ref 5): generates steady/unsteady subsonic aerodynamics for wing-body/aircraft configurations with external stores/nacelles including body wake effects.
- ZTAIC (Ref 6): generates unsteady transonic (modal) AIC's using externally-provided steady mean pressures.

- ZONA7 (Ref 7): generates steady/unsteady supersonic aerodynamics for wing-body/aircraft configurations with external stores/nacelles (formerly ZONA51 for lifting surfaces).
- ZONA7U (Ref 8): generates steady/unsteady unified hypersonic and supersonic aerodynamics for wing-body/aircraft configurations with external stores/nacelles.

Among these four methods, the transonic code ZTAIC is capable of predicting the "*transonic dip*" associated with flutter boundary of fighters. While using steady pressure input (provided by measurements or a CFD Navier-Stokes Solver), the ZTAIC method solves the transonic small disturbance equation for unsteady aerodynamics. Unlike typical CFD methods, ZTAIC does not require grid generation. Because of the accurate steady pressure input, the correct unsteady shock location and strength computed by ZTAIC are ensured. This can be seen by the excellent correlation between ZTAIC prediction and wind tunnel test data of the AGARD 445.6 transonic flutter boundary (Figure 2.2) and the unsteady pressure distribution of the oscillating Lessing wing (Figure 2.3).

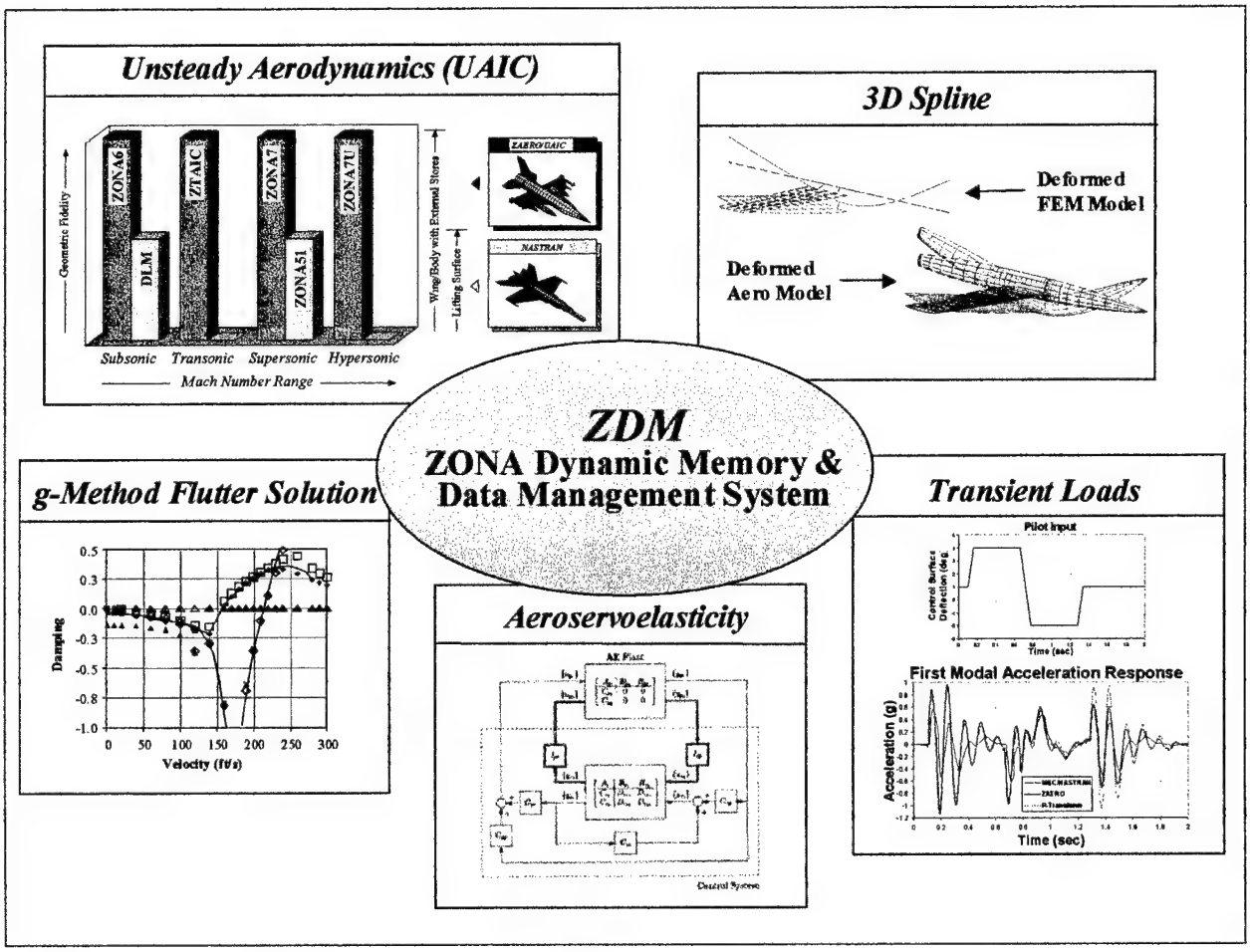
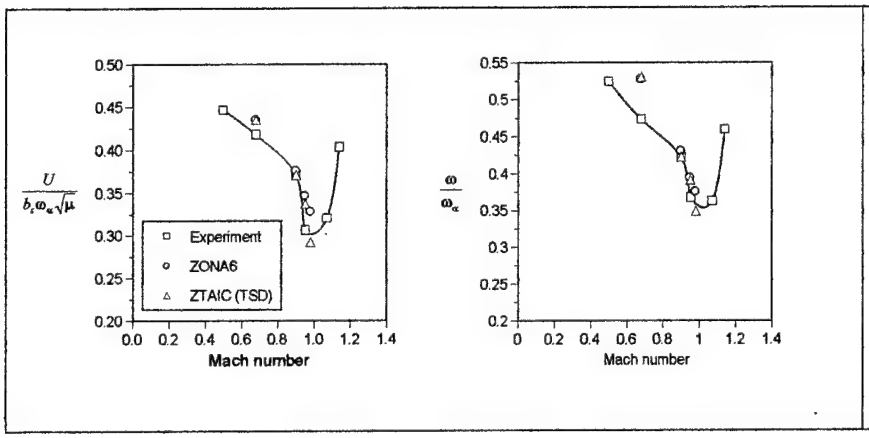


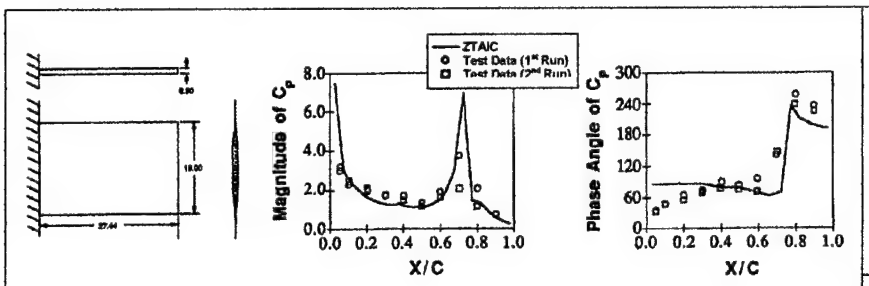
Figure 2.1 Six Essential Modules in ZAERO.

As discussed earlier, due to the pure-aerodynamic characteristics of the AIC matrix, the UAIC matrices generated by the UAIC module can repeatedly be used when changes in different structural properties or slightly different aerodynamic configurations are needed in aeroelastic analysis/design. This renders ZAERO a computationally efficient tool for massive flutter analysis.



- Steady pressure input provided by CAPTSD
- Good agreement with test data
- At subsonic speed, ZTAIC results approach that of ZONA6, as expected
- ZTAIC predicts the transonic flutter dip

Figure 2.2 AGARD Standard 445.6 Wing.



- Used Lessing's test data as the steady pressure input
- Thus yields correct unsteady shock position and magnitude

TRANSONIC UNSTEADY PRESSURES

Figure 2.3 Lessing Wing in First-Bending Oscillation (M=0.9, k=0.13, η=0.5 x span).

The 3-D Spline Module

For low fidelity unsteady aerodynamic methods like DLM, the Infinite Plate Spline (IPS, Ref 9) is sufficient for the transferal of data between the structural and aerodynamic models. To perform the data transferal for high fidelity modeling of an entire aircraft/store configuration requires a 3-D spline capability. The 3-D spline module of ZAERO is equipped with an improved 3-D Thin Plate Spline (TPS, Ref 10) method that provides the displacements and loads in six degrees of freedom at each structural and aerodynamic grid point. The 3-D spline module can also be used to generate a deformed aerodynamic model to verify the spline input by graphical visualization. A typical graphical display of a deformed wing-body configuration is shown in the 3-D spline module diagram of Figure 2.1.

The Flutter Module/g-Method

The flutter module consists of two flutter solution techniques; *the K-method* and *the g-method.* The g-method is a ZONA's newly developed flutter solution method (Ref 11) that generalizes the K-method and the P-K method for true damping prediction. The g-method is superior to the P-K method by the following merits.

- *True Damping Prediction*
  The theoretical foundation of the true-damping prediction capability of the g-method is based on the inclusion of a first-order aerodynamic damping term in the flutter equation that is rigorously derived from the Laplace domain aerodynamics. Such a true-damping prediction capability is lacking in the K-method and P-K method.
- *Solution Robustness: the g-Method*
  The g-method utilizes a reduced frequency sweep technique to search for the roots of the flutter equation and a predictor-corrector scheme to ensure the robustness of the sweep technique. The P-K method typically requires an iterative procedure for flutter solutions and occasionally suffers from a solution breakdown. By contrast, the g-method's sweep technique is proven to be efficient and robust and can obtain an unlimited number of aerodynamic lag roots. The inclusion of aerodynamic lag roots can provide important physical insight of the flutter solutions.
- *Match-Point Flutter Solutions*
  The generalized formulation of the g-method (as opposed to the K-method and the P-K method) provides an automated matching feature of the flutter solution that satisfies the Mach number-velocity-density relations of a given atmospheric table.

Therefore, with the g-method built in, the flutter module in ZAERO can further be developed as an effective *data mining system* to search for critical flutter, LCO and ejection load cases. This is attributable to:

- Its true damping prediction can accurately identify the severity and sensitivity of the flutter instability. With a nonlinear structural damping criteria which will be shown in the later section, the g-method solution can be used to recognize an LCO case from the flutter-solution cases.
- Its match-point flutter solution feature avoids an additional iterative procedure between the densities and velocities which is normally required by a non-match-point flutter solution procedure. Therefore, the match-point flutter solution can be directly correlated with flight test data.
- Its reduced frequency sweep technique can ensure the robustness of an automated data mining system which would not work with an unreliable P-K method.

In addition, the ZAERO/flutter module has an existing capability for rapid flutter solutions of aircraft with different inertial properties (for instance, the fuel weight variations). This capability utilizes a so-called "*mass increment technique*" which perturbs the following flutter equation with incremental mass ΔM, i.e.

$$\phi^T (M + \Delta M)\phi \ddot{q} + \phi^T k \phi q = q_\infty Q(ik) q \tag{2.1}$$

where:
$\phi^T M \phi$ and $\phi^T k \phi$ are the generalized mass and stiffness matrices, respectively, of the baseline aircraft.
$q_\infty Q(ik)$ is the generalized aerodynamic force, q is the generalized modal coordinate, ϕ is the mode shapes of the baseline aircraft, and
ΔM is the incremental mass added to (or subtracted from) the baseline aircraft, e.g., increase (or decrease) of fuel in the tank.

The validity of Eq (2.1) lies in the fact that the flutter mode of the aircraft with the incremental mass can be expressed by the mode shapes of the baseline aircraft (without incremental mass) if a sufficient number of modes are used. This also implies that solving Eq (2.1) does not require additional FEM and unsteady aerodynamic analysis because all matrices in Eq (2.1) remain unchanged except ΔM, an input parameter.

Some ZAERO users have adopted the mass increment technique to accelerate the massive store screening process by also ignoring underwing store aerodynamics. In this way, a very fast procedure results for flutter solution generation of thousands of store configurations by using only one set of AIC and FEM solutions. This procedure can be used as a preliminary step to compliment the MSM procedure for rapid screening of critical flutter cases. ZONA has implemented this procedure as an option in the RAFEL system.

2.2 Application of ZAERO to RAFEL Software System

The RAFEL software system consists of three sub-systems: an invariant unified aerodynamic influence coefficient (UAIC) submatrix generation system, a Massive Store Management (MSM) system and a data mining system.

2.2.1 Invariant UAIC Submatrices for Store/Aircraft Configurations

The unified Mach number Aerodynamic Influence Coefficient (UAIC) matrix generated by the ZAERO/UAIC module is a pure aerodynamic entity and is independent of the structural properties. For a given aircraft with multiple stores, this UAIC (at a given Mach number and reduced frequency pair) can be partitioned into five different kinds of submatrices, i.e.

$$[UAIC] = \left[\begin{array}{c|c|c|c} A_{aa} & A_{s_1 a} & & A_{s_i a} \\ \hline A_{as_1} & A_{s_1 s_1} & & A_{s_i s_1} \\ \hline & & \ddots & \\ \hline A_{as_i} & A_{s_1 s_i} & & A_{s_i s_i} \end{array}\right] \tag{2.2}$$

A_{aa} is the aircraft-to-aircraft aerodynamic submatrix
$A_{s_i s_i}$ is the i^{th} store-to- i^{th} store aerodynamic submatrix
$A_{s_i a}$ is the i^{th} store-to-aircraft aerodynamic submatrix

A_{as_i} is the aircraft-to- i^{th} store aerodynamic submatrix, and

$A_{s_is_j}$ and $A_{s_js_i}$, where i ≠ j, represents the store-to-store aerodynamic submatrix between each two different stores.

The only submatrices in Eq (2.2) that need to be newly computed are the store-to-store submatrices (shaded areas in Eq 2.2) $A_{s_is_j}$ and $A_{s_js_i}$, where i ≠ j. Clearly, the self-influence submatrices A_{aa} and $A_{s_is_i}$ shown above are invariant as long as their own aerodynamic shapes remain the same. For a given type of store designated to a fixed weapon-carriage station, it can be seen that A_{s_ia} and A_{as_i} are also invariant since the store-carriage stations with respect to a designated aircraft remain fixed. This implies that the submatrices A_{aa}, $A_{s_is_i}$, A_{s_ia}, and A_{as_i} can be pre-computed and saved in a database. For a given new store arrangement, these submatrices need not be re-computed, rather they can be retrieved from the database. In so doing, the computing effort of the total UAIC matrix generation can be substantially reduced. In fact, the proposed Massive Store Management (MSM) software system is constructed according to this proposed procedure which will be discussed in the next section.

2.2.2 The Total RAFEL Software Architecture

Figure 2.4 depicts the total software system architecture for massive flutter, LCO, ejection load analysis and the critical case selection. This software system consists of three subsystems: an invariant UAIC submatrix generation system, a Massive Store Management (MSM) software system, and a data mining system.

Invariant UAIC Submatrix Generation System

The functionality of this system is to generate the A_{aa}, $A_{s_is_i}$, A_{s_ia}, and A_{as_i} invariant UAIC submatrices, where i = 1, …, n, and n represents the number of all available stores with their associated weapon-carriage stations. The generation of these invariant submatrices is based on the assumption that the designated aircraft has fixed weapon-carriage stations. For instance, the F-16 aircraft shown in Part 1 of Figure 2.4 has 9 weapon-carriage stations. Every station has a set of candidate stores to be carried.

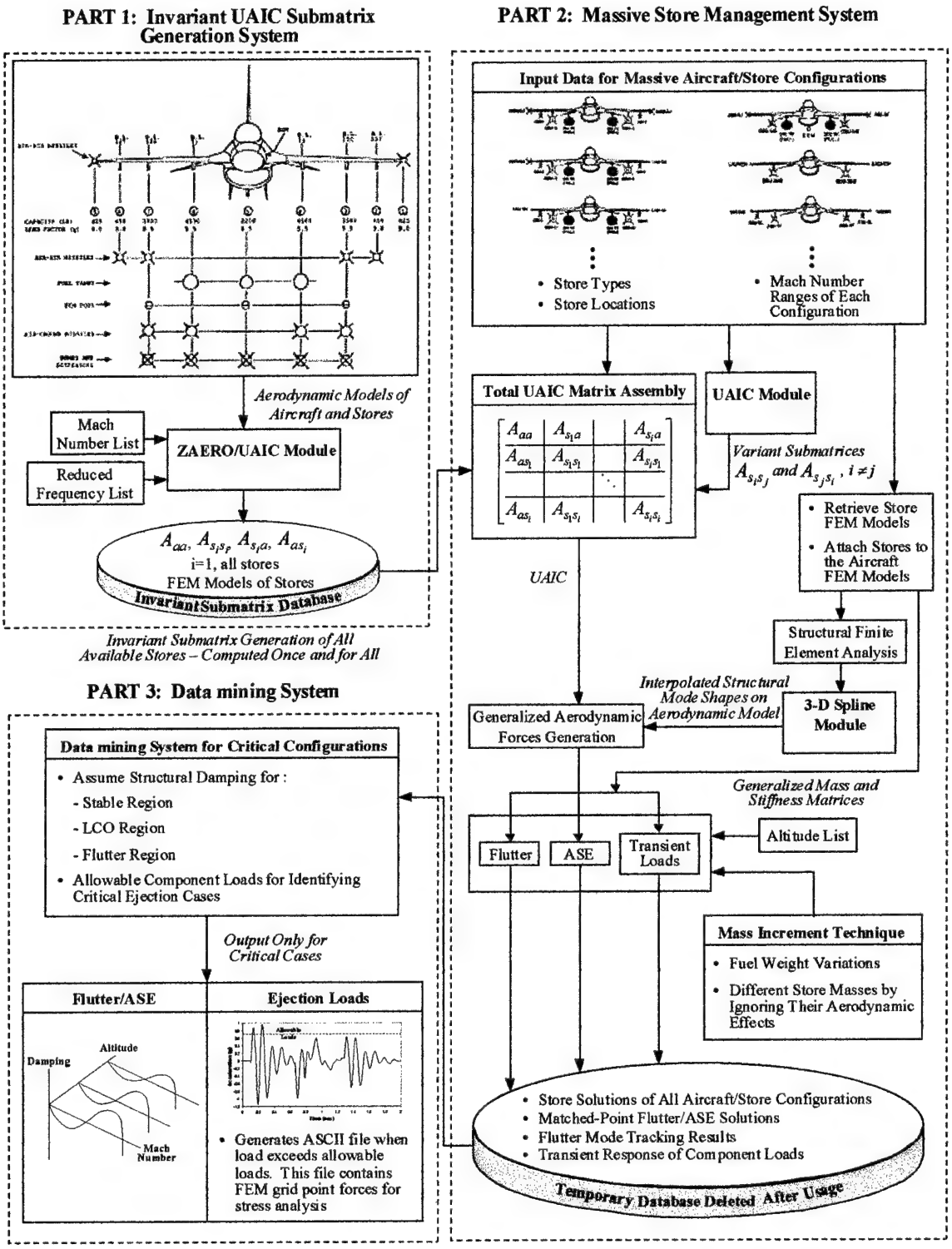


Figure 2.4 The Total RAFEL Software Architecture.

To design the invariant UAIC submatrix generation system, we first provide each store a label called the "*store label*" which marks the store and its designated weapon-carriage station. Note that a different store label is assigned for the same store located at different stations. Next, the

ZAERO/UAIC module is employed to generate the UAIC submatrices $A_{s_i s_i}$, $A_{s_i a}$ and $A_{a s_i}$ of all stores and save these submatrices in a database. Because the aircraft-to-aircraft submatrix A_{aa} is independent of stores, it only needs to be computed once. Note that each of the invariant matrix is also a function of Mach number and reduced frequency. These Mach numbers and reduced frequencies can be pre-selected according to the flight envelope of the designated aircraft and its structural characteristics. Clearly, to generate the above database that contains the invariant submatrices of all stores requires a large computing time. However, since these submatrices are computed once and for all, this long computing time should be considered as off-line data preparation and hence should not influence the efficiency of the subsequent massive store/aircraft aeroelastic analysis. Of course, if a new store is added to the list, its associated submatrices need to be newly computed in this manner and added to the database.

Massive Store Management System

The Massive Store Management (MSM) system is essentially a database management system for the total UAIC matrix assembly. For a given aircraft with multiple store configuration, the MSM system first retrieves the invariant submatrices from the database. Next, it activates the ZAERO/UAIC module to compute all variant submatrices. Finally, it assembles the invariant and variant submatrices together and generates the total UAIC matrix. Once the total UAIC matrix is obtained, the remaining tasks for an aeroelastic analysis are performed by the existing ZAERO engineering modules, as shown in Part 2 of Figure 2.4.

The 3-D spline module reads the output of the structural finite element analysis of the given aircraft/store configuration and computes the interpolated mode shapes on the aerodynamic model. Once these mode shapes and the total UAIC matrix are available, the generalized aerodynamic force matrices can be obtained immediately for an aeroelastic analysis, i.e. flutter, ASE or transient load analysis. This analysis is performed at various altitudes, and the solution at every Mach number and altitude pair is a matched-point solution.

It should be noted that the MSM system is a fully automated process. For a given aircraft/store configuration, the input of the MSM system (*e.g.*, the one shown in Part 2 of Figure 2.4) is the store label of each store and the Mach number range of interest. Since this constitutes a small amount of input, it takes little effort to set up an input file for a massive number of aircraft/store configurations. The MSM system continuously processes each configuration and stores its aeroelastic solutions on a temporary database. Thus, once the MSM system is activated, manual interaction from the engineer is no longer required.

Data Mining System

The main objective of the data mining system is to rapidly screen through the temporary database generated by the MSM system and to select the critical flutter, ASE, or ejection load cases for output display. The inputs of the critical flutter/ASE cases are the assumed structural damping levels that define three stability regions, namely the stable region, the LCO region, and the flutter region. The data mining system screens through all the damping solutions at every Mach number and altitude (M-h) pair for a particular aircraft/store configuration. If the damping

solutions at all M-h pairs are below the stable region, this configuration is classified as non-critical configuration and no output is displayed. If the damping solutions are above the stable region, a three-axis graphical file is generated which can display the damping solutions vs. Mach numbers and altitudes, as the one shown in Part 3 of Figure 2.4. The regions in the graphical display where the damping solutions exceed the LCO region are highlighted. A similar display for the frequency solution is also generated. It should be noted that since all flutter results generated by the g-method and the ASE analysis are matched-point solutions with true damping values, these results can be directly correlated with the flight test data. The time history shown in Part 3 of Figure 2.4 is a typical output in terms of component loads of the ejection load analysis. Again, only those configurations whose transient loads exceed the specified allowable loads are displayed. The corresponding region which exceeds the allowable loads will also be highlighted in the display.

2.2.3 Store-Aircraft Finite Element Modal Analysis Adopting the MSM System

To generate structural finite element models of massive number of aircraft/store configurations is a very time consuming task. However, the massive store management (MSM) system can be adopted to also automatically generate the finite element models. This is very similar to, but simpler than the UAIC matrix assembly process. While saving the UAIC submatrices, the finite element models of each store including the grid locations, connectivity and material properties are also saved on the database. For a given aircraft/store configuration, the MSM system retrieves all the store finite element models from the database and attaches them to the aircraft finite element model, then subsequently launches a finite element analysis. The output of this analysis will be directly imported to the ZAERO/3-D spline module for an aeroelastic analysis.

2.2.4 Design of a Database for the MSM System

The ZAERO/ZDM module (ZONA Dynamic Memory and database management system) will be adopted as the basic database management system for the MSM system. Among many other features, the ZDM has two data entity managers that are especially important to the efficiency of the MSM system.

Matrix Entity Manager

The matrix entity manager is designed to store and retrieve very large, often sparse, matrices. It minimizes disk storage requirements while allowing algorithms to be developed that can perform matrix operations of virtually unlimited size.

Relational Entity Manager

Relational entities are essentially tables. Each relation has data stored in rows (called entries) and columns (called attributes). Each attribute is given a descriptive name, a data type, and constraints on the values that the attributes may assume (i.e., integer, real or character data). These definitions are referred to as the schema of the relation.

Clearly, the minimum disk storage capability of the matrix entity manager not only increases the efficiency of saving and retrieving matrices, but also reduces the required disk size of the computer.

The relational entity manager can be used as a file system manager. For instance, the "*store label*" can be defined as an attribute in a relational data entity. The data addresses in the database of the UAIC matrices and the finite element models can be stored in other attributes. Once the relational data entity is established, the data address of each store in the database can rapidly be located and subsequently retrieved by the matrix entity manager.

SECTION 3

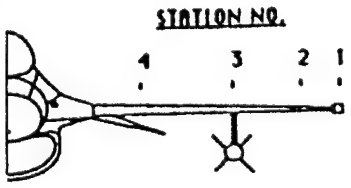
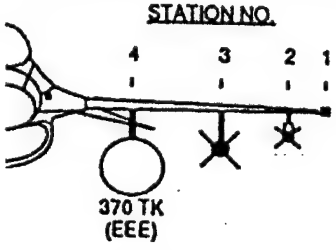
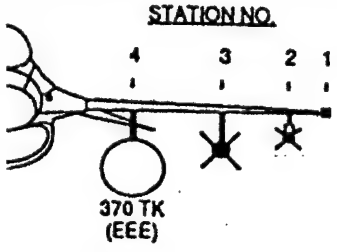
SELECTED TEST CASE DATA

3.1 Flight Test Data

Three F-16 with store configurations adopted from Ref 1 are selected as the test cases of the proposed software system. Reference 1 described that the aircraft is an F-16A, tail number 80-0573. This aircraft is a Block 15 F-16 modified for flutter testing. The store configurations and their associated F-16 weapon-carriage stations are presented in Table 3.1. A more detailed store mass properties and store attachment reference points are given in Tables 3.2 and 3.3. These data are taken from Ref 1 and used in the present work as the basis for modeling the structural finite element data and aerodynamic panel of the three configurations.

According to Ref 1, the three store configurations experienced different aeroelastic instabilities in flight tests; classified by Ref 1 as classical flutter, typical LCO and non-typical LCO. The measured flight test response for these cases are given in Figs 3.1-3.3. These data are also adopted from Ref 1 and used in the present work to correlate the numerical predictions with the flight test data. Because of their distinct aeroelastic instabilities, these three store configurations are the ideal test cases of the present procedure.

Table 3.1 Store Configurations.

Sta. No.	Aeroelastic Response Type		
	Case 1 Classical Flutter	**Case 2 Typical LCO**	**Case 3 Non-typical LCO**
1	LAU-129/A launcher	LAU-129/A launcher	16S210 launcher
2	Empty Station	LAU-129/A launcher AIM-9L missile	LAU-129/A launcher AIM-9L missile
3	Launcher/pylon Air-surface missile	Launcher/pylon Air-surface missile	Launcher/pylon AIM-120A missile
4	Empty Station	Pylon 370-gal fuel tank (empty)	Pylon 370-gal fuel tank (empty)
Front View	 Air-Surface Missile		

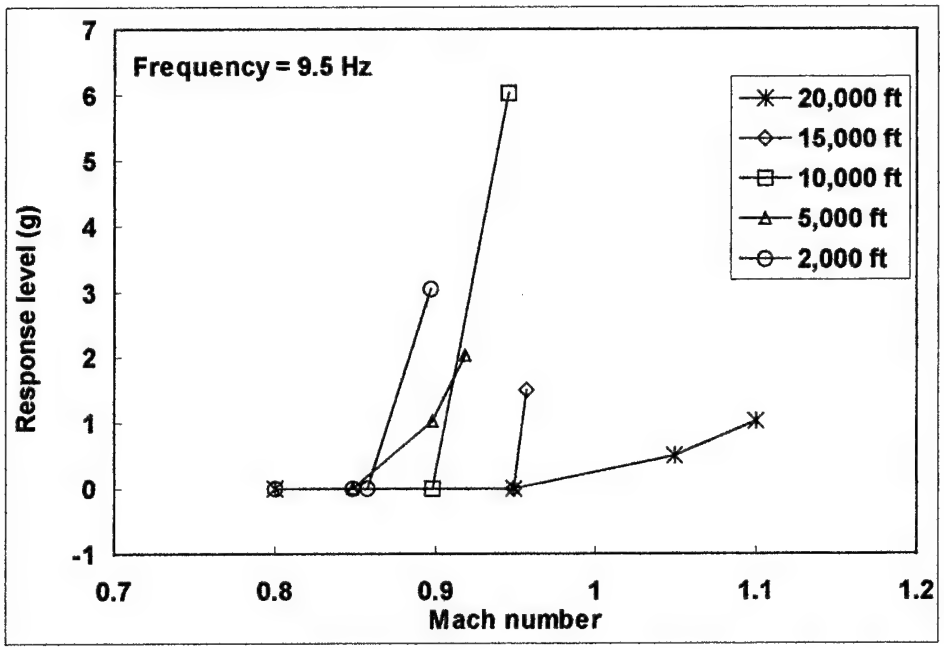


Figure 3.1 Measured Oscillatory Wingtip Response of Flight Test for Classical Flutter Configuration.

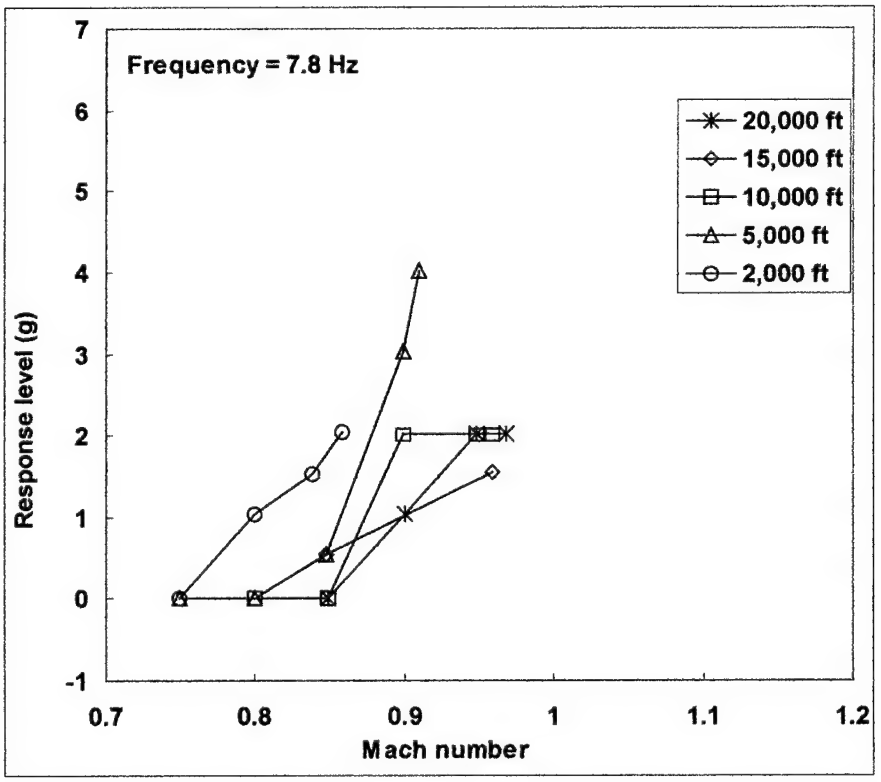


Figure 3.2 Measured Oscillatory Wing Tip Response of Flight Test for the Typical LCO Configuration.

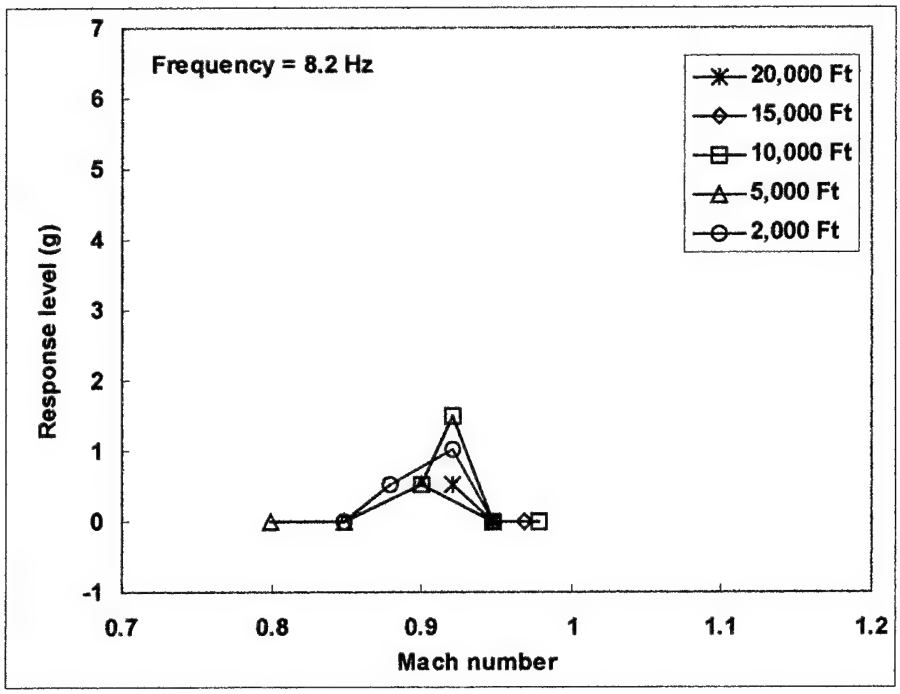


Figure 3.3 Measured Oscillatory Wing Tip Response of Flight Test for the Non-Typical LCO Configuration.

Table 3.2 Store Mass Properties (Taken from Reference 1).

Store	Weight (lbs)	Center of Gravity			Moment of Inertia, slug ft^2		
		x, in	*y*, in	*z*, in	Roll	Pitch	Yaw
Air-surface missile	502.0	-14.58	0.00	-25.00	1.76	139.87	140.00
AIM-9L missile	200.0	-21.10	0.00	-17.50	0.42	51.00	51.00
AIM-120 missile	345.0	-14.73	0.00	-25.00	0.65	96.65	96.59
LAU-129/A wing tip launcher	88.0	-13.72	2.88	0.00	-	13.86	13.86
LAU-129/A underwing launcher	88.0	-13.72	0.00	-14.50	-	13.86	13.86
16S210 wingtip launcher	69.0	-15.28	3.60	0.00	-	11.68	11.68
Launcher/Pylon	138.0	-3.60	0.00	-11.00	1.46	14.35	13.55
370-gal fuel tank (empty)	438.5	-8.37	0.00	-18.22	17.12	176.11	165.69

Table 3.3. Store Attachment Reference Points (Taken from Reference 1)

Station	Location	Type	*x*, in	*y*, in	*z*, in
1	Wing Tip	Missile	380.46	180	0
2	Underwing	Missile	375.72	157	0
3	Underwing	Weapon	349.67	120	0
4	Underwing	Fuel Tank	325.40	71	0

3.2 Overall Computational Strategy

To investigate the influence of store configurations on the aeroelastic instability and, more importantly, to study the differences between the classical flutter, typical LCO and non-typical LCO, a number of aeroelastic instability analysis were conducted in the present work as follows:

(1) Three structural finite element models of the F16/store as described in Table 3.1 are used.
(2) For each of the three cases above, three aerodynamic models were used including the wing with tip launcher, the whole aircraft without store, and the whole aircraft with stores.
(3) Two flutter calculation procedures were conducted using linear and nonlinear unsteady aerodynamic methods.
(4) The calculations were performed to two structural dynamic models: the structural models with and without rigid body modes.
(5) The flutter results were presented based on two structural damping assumptions : g = 0% and g=1.0 %.
(6) To investigate the correlation of the flutter calculations with the flight test data, the flutter results were presented for five altitudes, including sea level, 5 kft, 10 kft, 15 kft, and 20 kft.

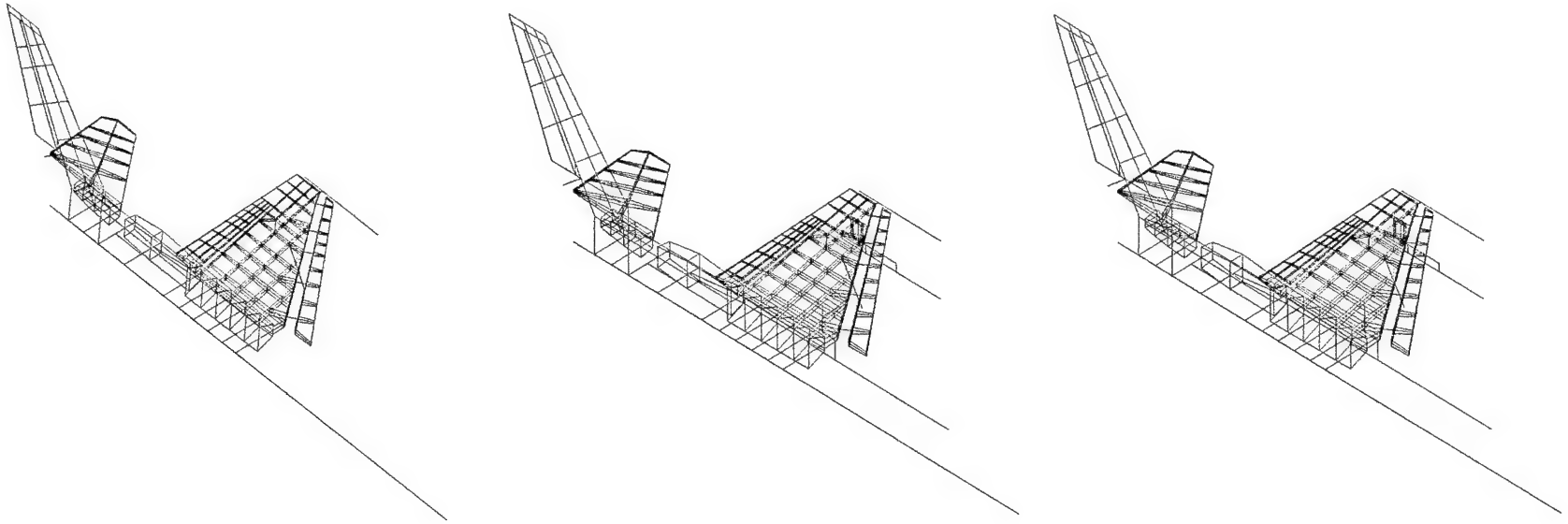
3.3 Structural Finite Element Data

The structural finite element model for each of the three cases is shown in Fig 3.4. Symmetric modes were not considered in the present analysis since the it was known from the flight test results that the actual instability were anti-symmetric. However, the computational codes, including MSC/NASTRAN and ZAERO, are applicable to a more general case, *i.e.* symmetric, anti-symmetric and asymmetric configurations.

The natural frequencies for the whole aircraft with stores of each case are given in Table 3.2. The NASTRAN data needed to generate the natural frequencies and mode shapes are given in Appendices A, B, and C for the classical flutter, typical LCO and non-typical LCO cases, respectively. These natural frequencies and mode shapes are used in the present flutter/LCO predictions as described in the next three sections.

Table 3.4 Natural Frequencies of F-16A (with Rigid Body Modes).

Mode Shape	Natural frequency (Hz)		
	Case 1 Classical Flutter	Case 2 Typical LCO	Case 3 Non-typical LCO
1	0.0	0.0	0.0
2	0.0	0.0	0.0
3	0.0	0.0	0.0
4	9.01	7.74	8.16
5	9.91	8.10	8.36
6	12.03	9.77	10.71
7	12.20	10.93	11.58
8	13.61	11.97	12.60
9	15.69	12.42	13.99
10	17.41	13.74	14.84
11	20.71	15.19	15.52
12	29.59	17.23	17.70
13	29.76	19.53	19.90
14	33.94	22.19	22.44
15	36.45	24.00	23.93
16	39.68	26.09	26.60
17	41.79	29.75	29.96
18	44.05	30.55	31.72
19	44.92	31.58	32.36



(a) (b) (c)

Figure 3.4 Finite Element Model of F16A – (a) Classical Flutter Case (b) Typical LCO Case, (c) Non-typical LCO Case.

3.4 Aerodynamic Model

Three aerodynamic models (Figure 3.5) are generated for each of the three F16/store configurations as follows:

- Model 1 : Wing with tip launcher only
- Model 2 : Whole aircraft without under stores
- Model 3 : Whole aircraft with stores.

The aerodynamic influence coefficient is calculated based on two different methods: linear and nonlinear unsteady aerodynamics. The linear aerodynamic methods are ZONA6 and ZONA7 for subsonic and supersonic flows, respectively. The nonlinear aerodynamic method is ZONA Transonic Aerodynamic Influence Coefficient (ZTAIC) method. These three aerodynamic codes are the essential parts of ZAERO to generate the AIC of the whole configurations, including fuselage, wing, empenage and stores.

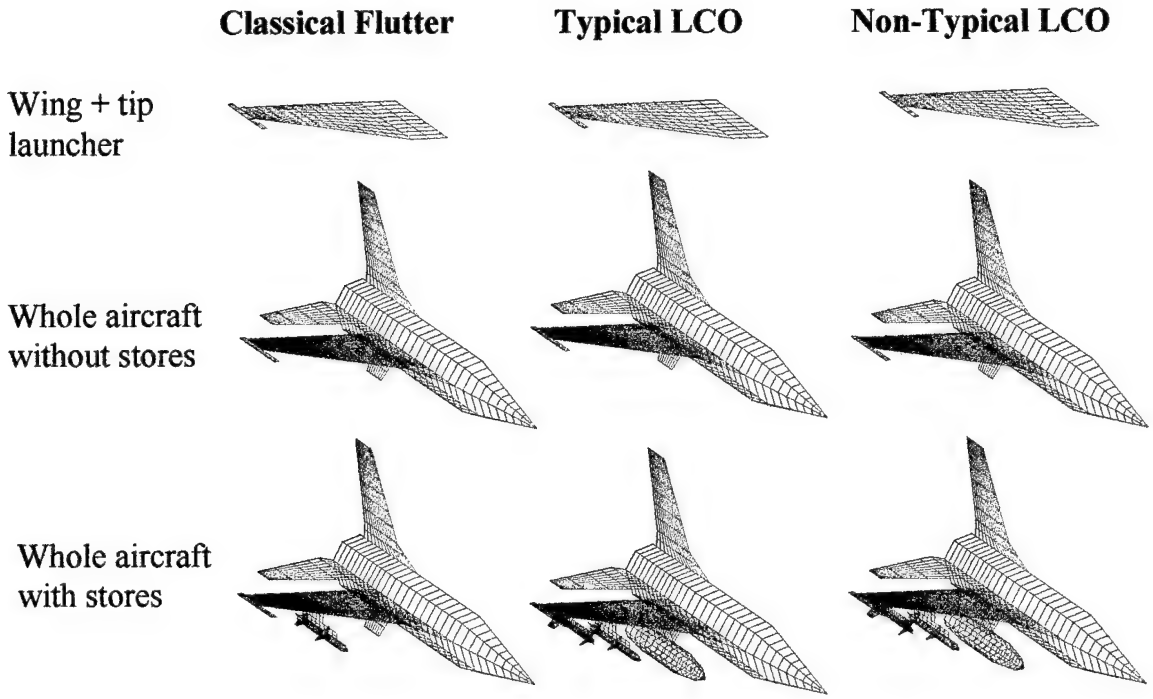


Figure 3.5 Aerodynamic Models of F-16/Store

3.5 Steady Transonic Aerodynamic Data

The steady transonic aerodynamic data in the present work was supplied by Denegri of Eglin Air Force Base for five Mach numbers, including M = 0.8, 0.90, 0.95, 0.98, and 1.05. The pressure distribution for the wing lower and upper surfaces of each Mach number are shown in Figure 3.6.

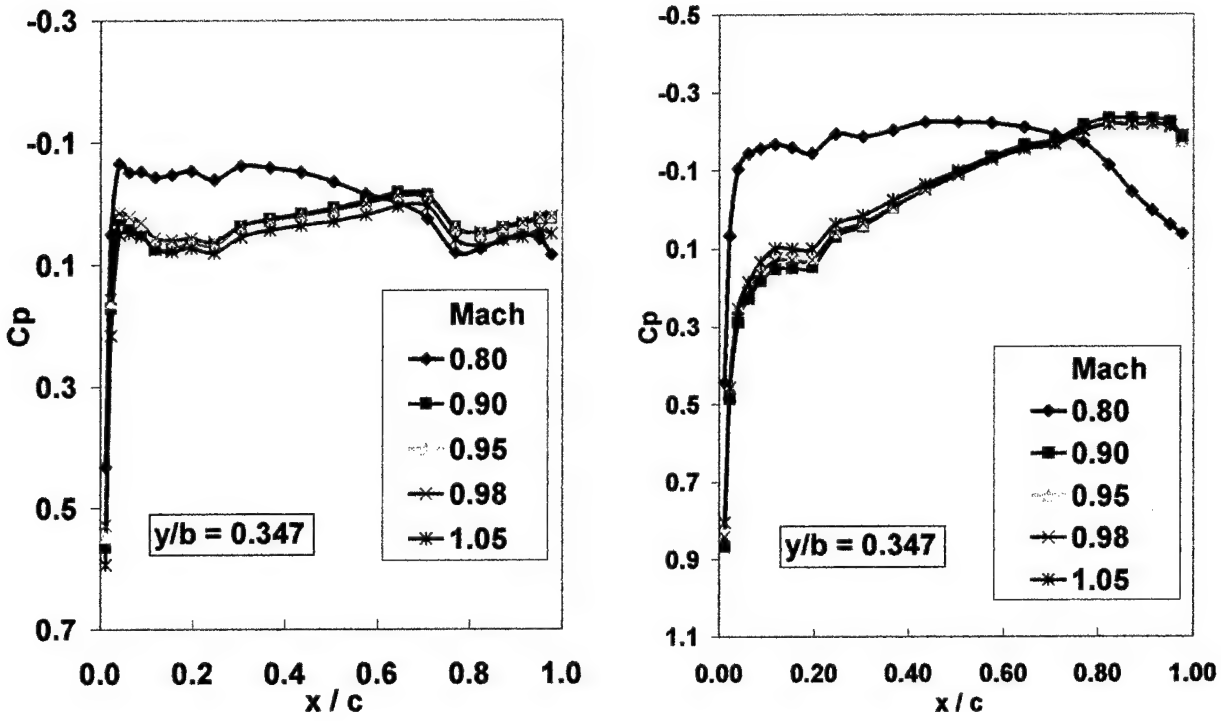


Figure 3.6a Cp Distribution at y = 0.347 b.

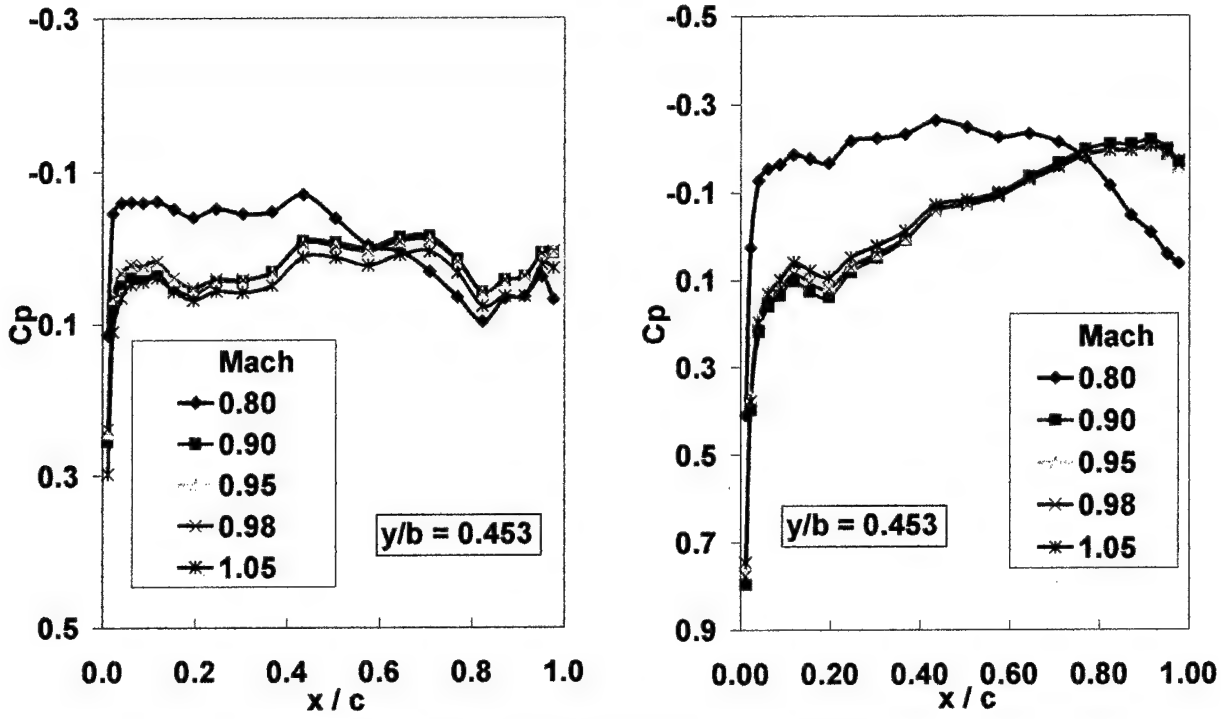


Figure 3.6b Cp Distribution at y = 0.453 b.

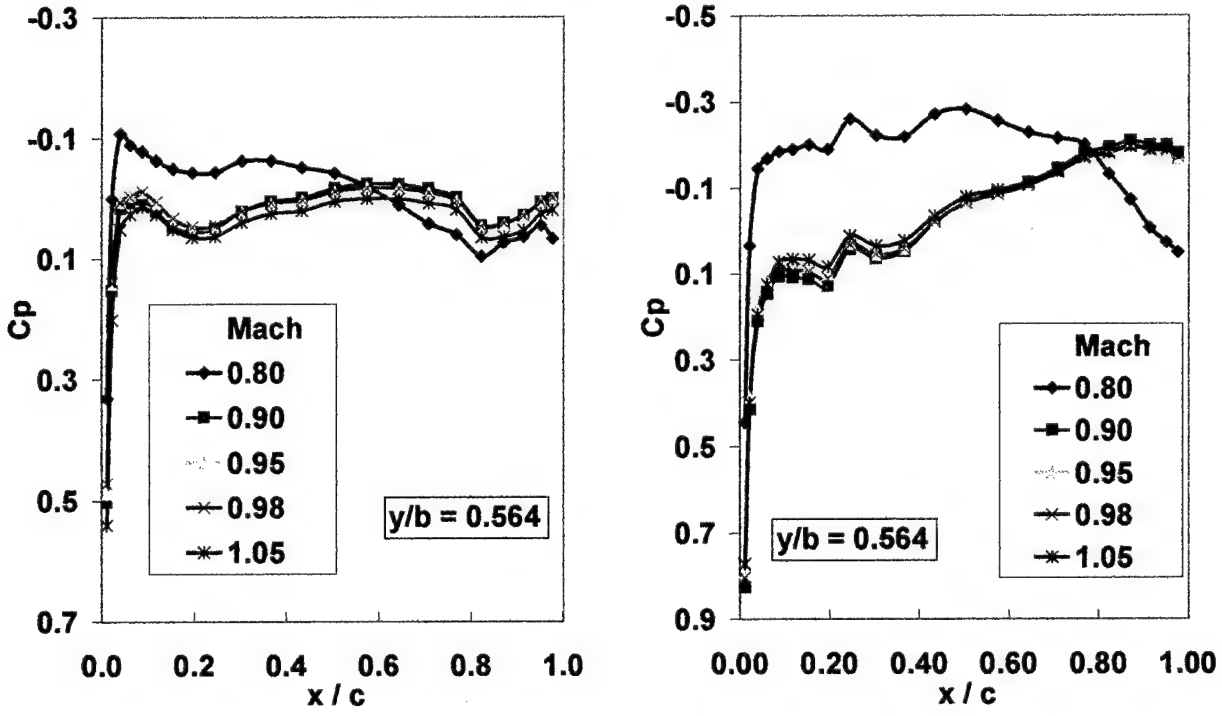


Figure 3.6c Cp Distribution at y = 0.564 b.

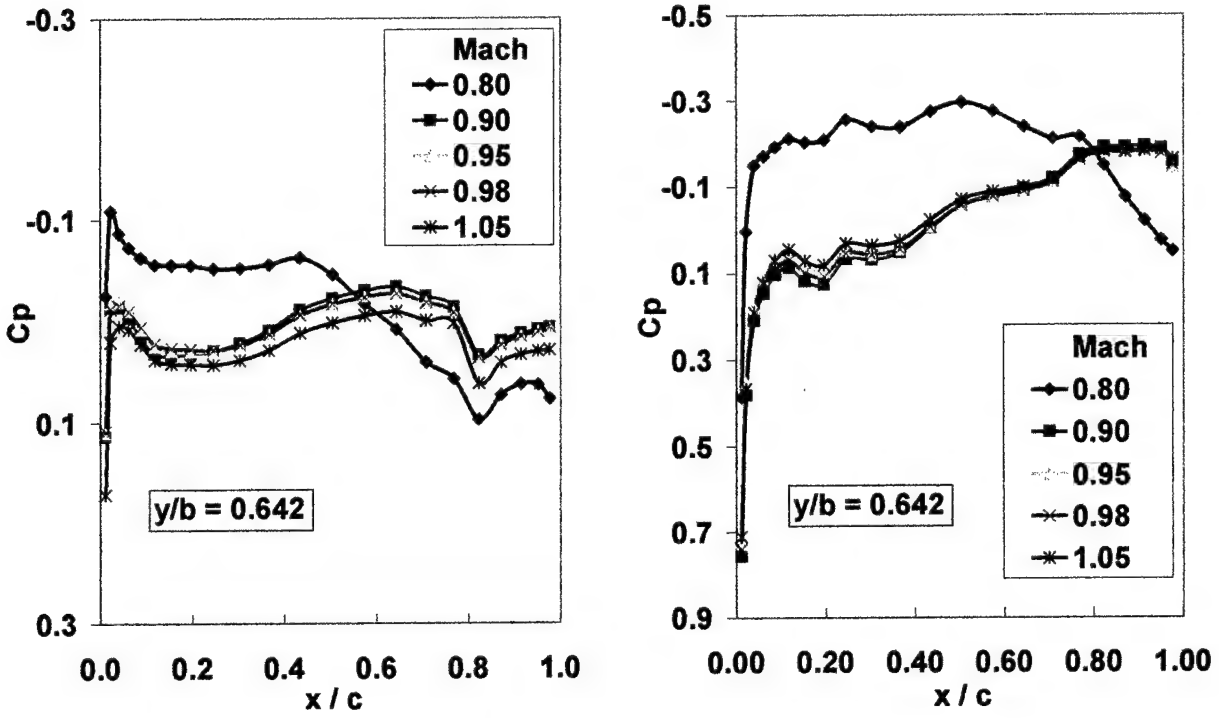


Figure 3.6d Cp Distribution at y = 0.642 b.

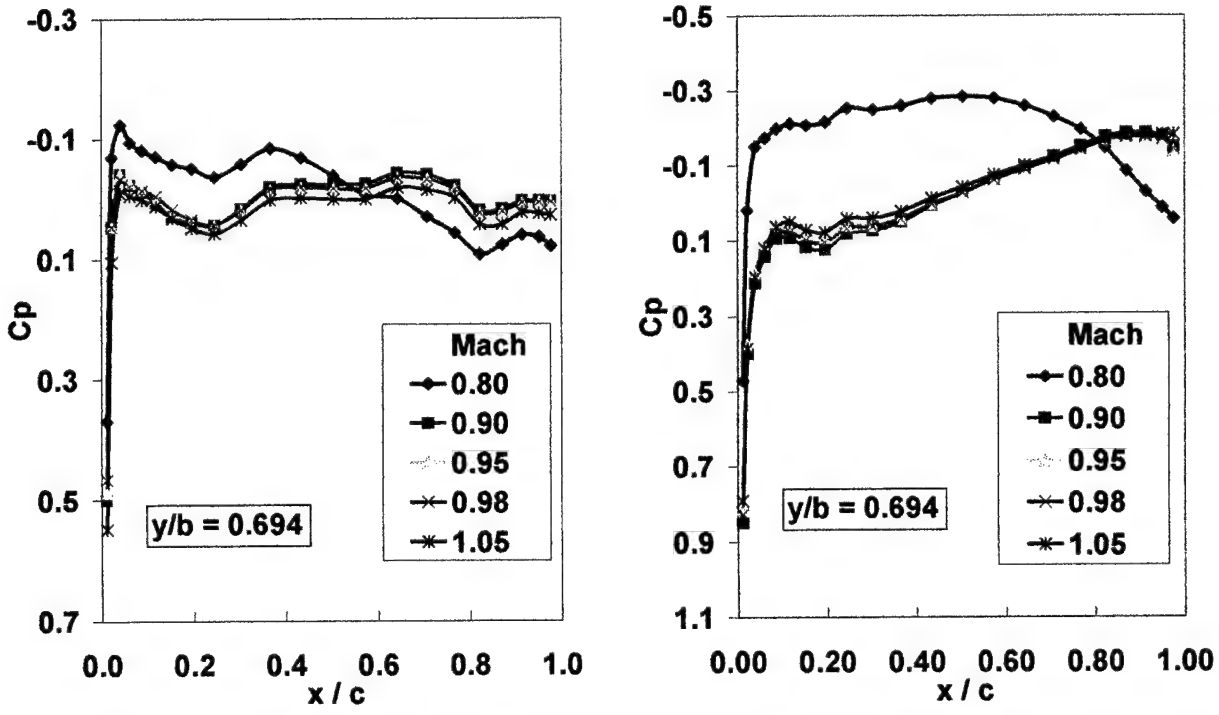


Figure 3.6e Cp Distribution at y = 0.694 b.

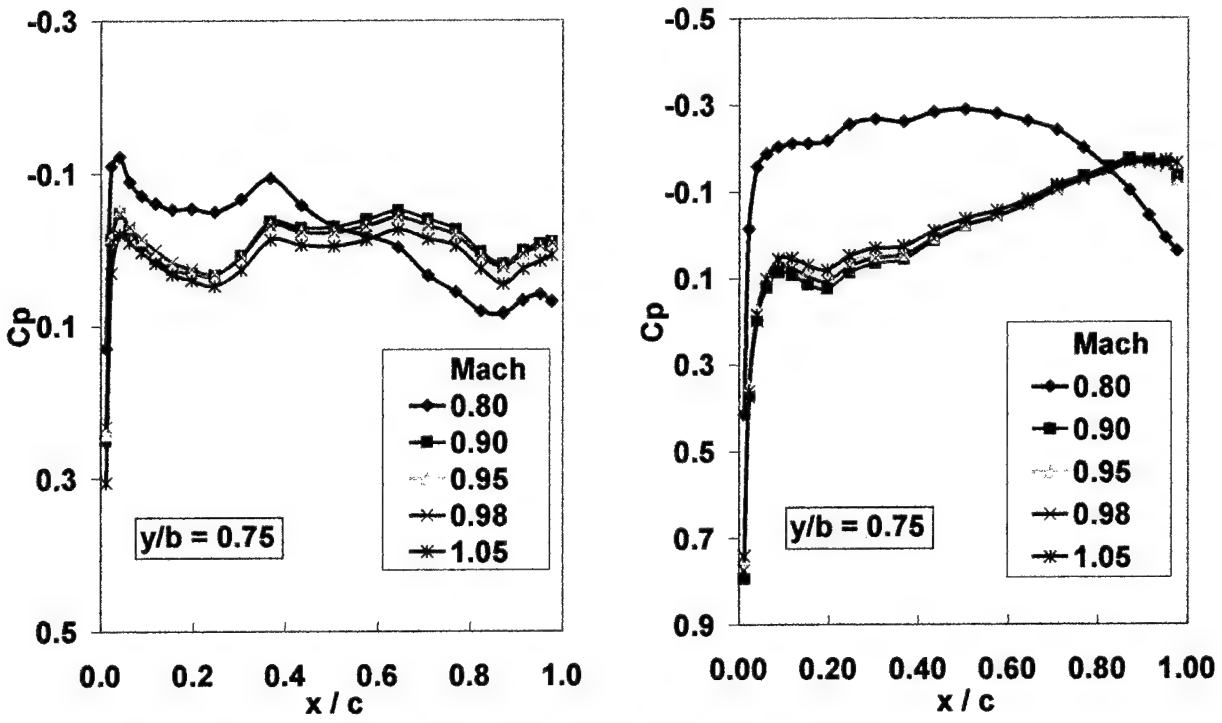


Figure 3.6f Cp Distribution at y = 0.75 b.

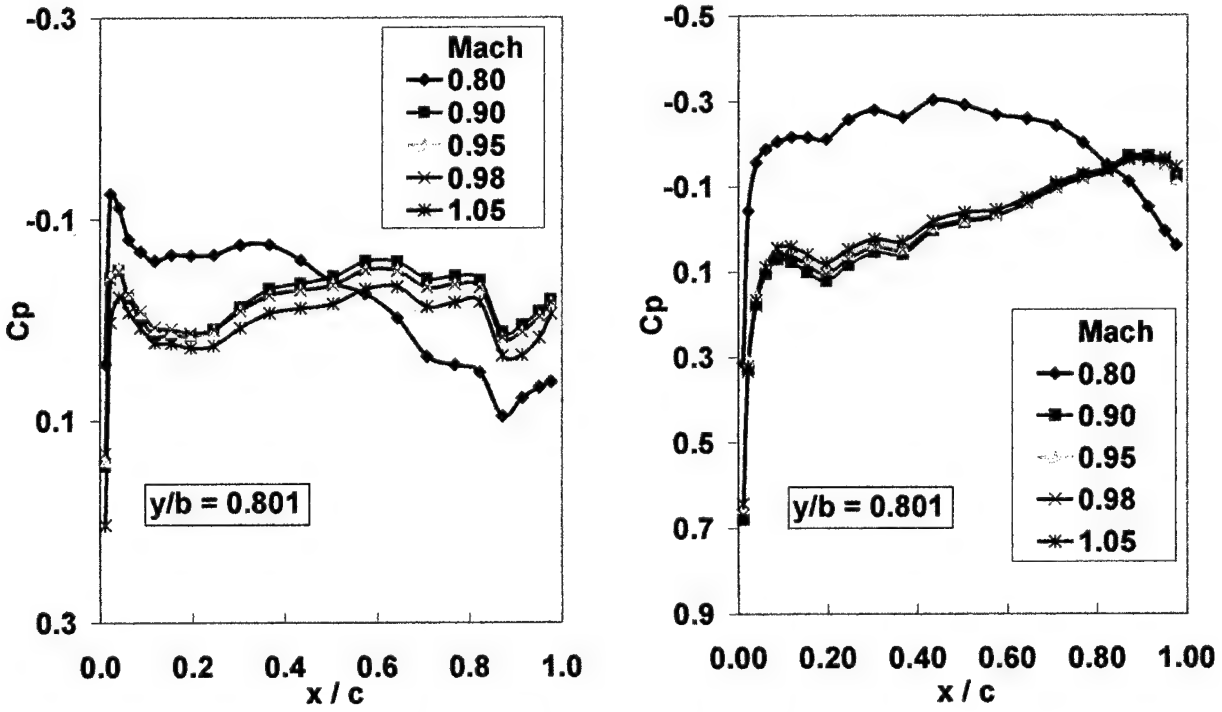


Figure 3.6g Cp Distribution at y = 0.801 b.

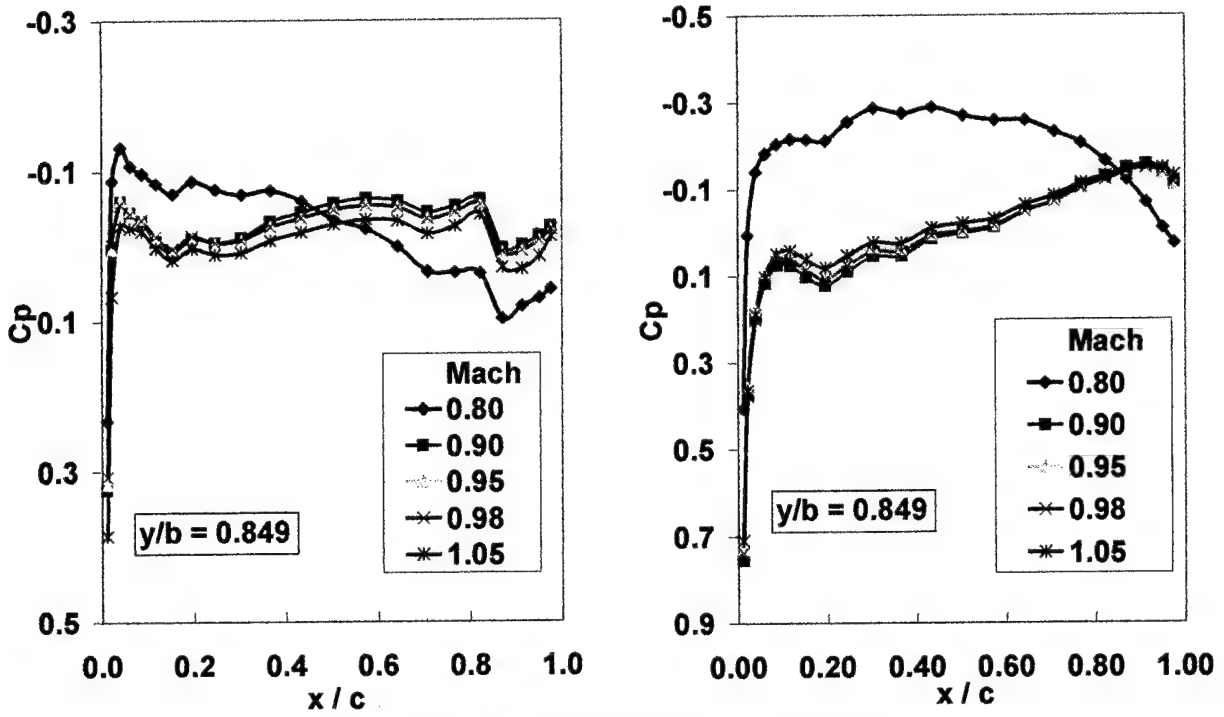


Figure 3.6h Cp Distribution at y = 0.849 b.

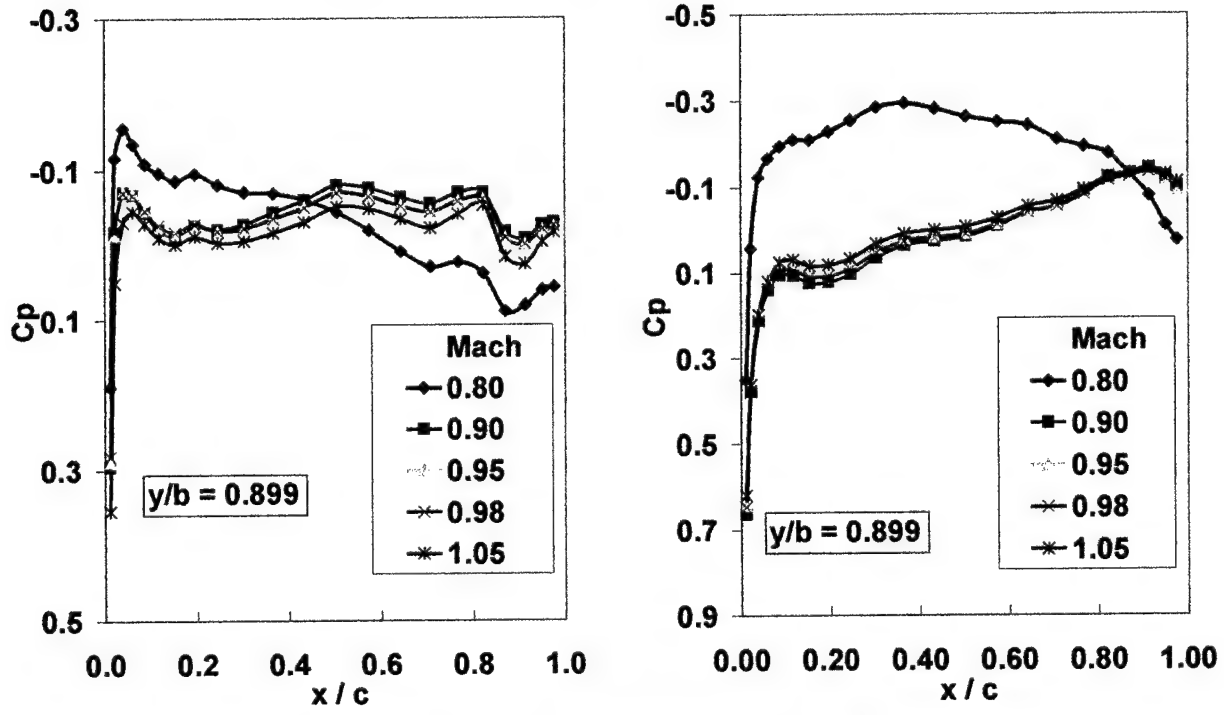


Figure 3.6i Cp Distribution at y = 0.899.

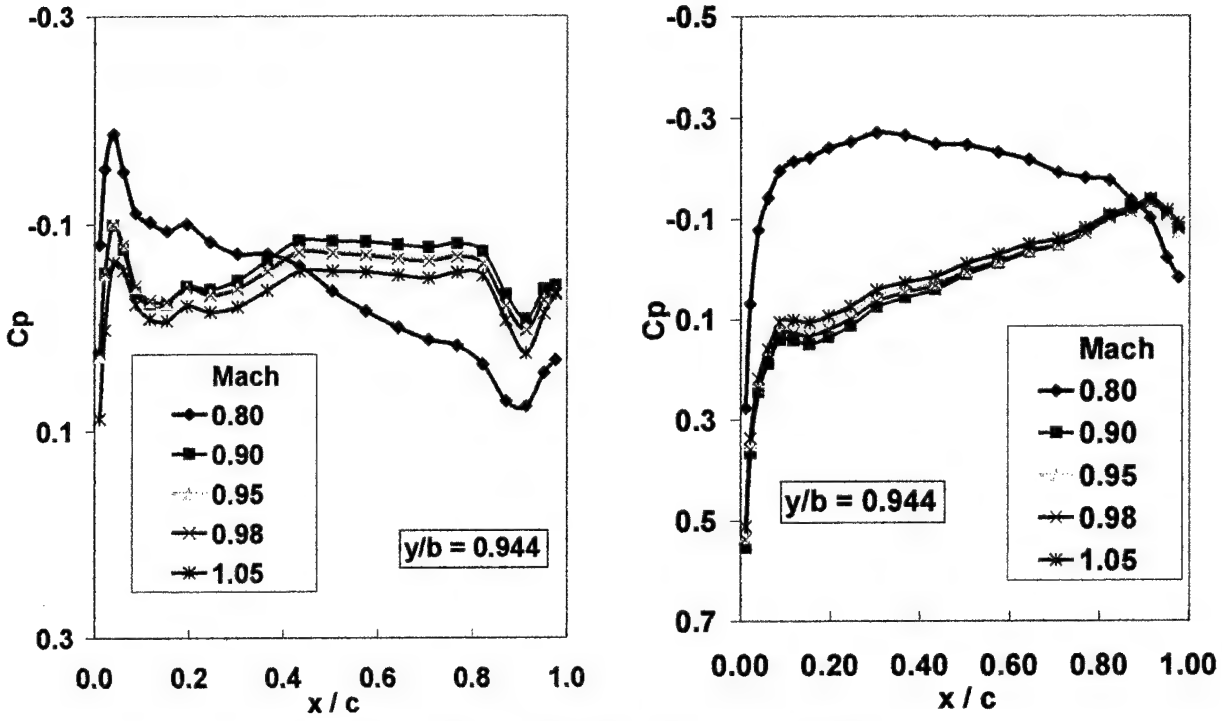


Figure 3.6j Cp Distribution at y = 0.944 b.

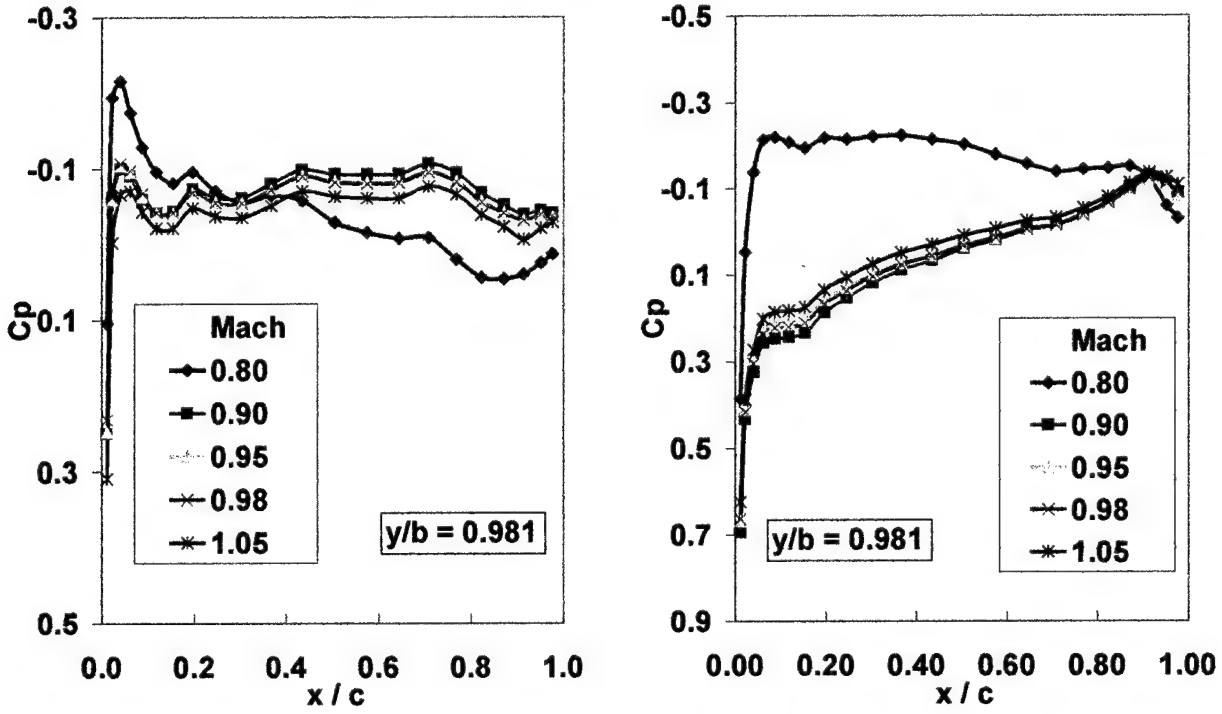


Figure 3.6k Cp Distribution at y = 0.981 b.

SECTION 4

CORRELATION OF THE F-16 / STORE CLASSICAL FLUTTER PREDICTIONS WITH FLIGHT TEST DATA

4.1 Flight Test Result and Previous Numerical Prediction

Reference 1 described that a classical flutter instability occurred during the flight test of F-16 with the air-surface missiles at Station 3 and LAU-129/A launcher at the wing tip (Figure 3.1). The instability response was characterized by a sudden onset of high–amplitude wing oscillations. The measured oscillatory wing tip response during level flight at five altitude is shown in Fig 3.1. At 10,000 ft altitude and level flight, no significant structural responses occurred between Mach 0.80 and 0.90, but a rapid onset of high amplitude anti-symmetric oscillations was encountered at Mach 0.95 and frequency of 9.5 Hz. Similar behavior was observed for other test altitudes.

An attempt to predict this classical flutter case has been conducted by Denegri in Refs 1 and 18. The calculation was performed at M = 0.90. The aerodynamic model used in Ref 1 and 18 is an isolated wing with tip launcher only, *i.e.* the same as the aerodynamic model #1 of the present work as shown in Fig 4.1. No aerodynamic modeling of fuselage, empenage and underwing stores is included. The only influence of the fuselage, empenage and stores considered in the flutter analysis is their effect on structural modal characteristics. The flutter calculation was conducted using the non-matched method. Two critical speed were found in the calculations. The first critical speed and frequency are V_f = 442 KCAS and $_{ff}$ = 10.17 Hz with a hump-mode type of flutter mode. The second critical speed is at V_f = 745 KCAS and $_{ff}$ = 9.37 Hz with an explosive type of flutter mode (Ref 18). The result indicates that the flight test frequency is well correlated with the second flutter mode frequency. However, the calculated flutter speed was higher than the flight test data.

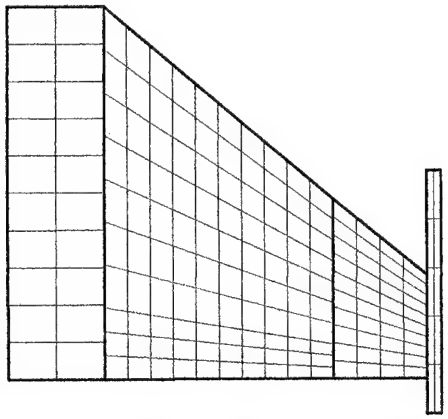


Figure 4.1 Aerodynamic Model #1 for the Classical Flutter Case.

4.2. Linear Aerodynamic Approach

4.2.1 Aerodynamic Model #1

The first aerodynamic model of the present work is the isolated wing with tip launcher (Figure 4.1), *i.e* the same as the model used in Ref 1. Figure 4.2 shows the first four natural (undamped) mode shapes. Employing a non-matched point flutter analysis of ZAERO at M= 0.90 and sea level density, the first critical speed was found to be V_f = 456 KCAS and flutter frequency was f_f = 10.17 Hz (dominated by the third structural mode), and the second flutter speed/frequency was V_f = 752 KCAS / f_f = 9.36 Hz (dominated by the first structural mode). These results are very close to the analysis results in Refs 1 and 18 as shown in Table 4.1 and Fig 4.3. Figure 4.4 shows the flutter mode shape for V_f = 752 KCAS at several time steps. The V-g and V-f plots of the present flutter analysis given in Fig 4.4 show similar results to Fig 12 of Ref 1. Note that Refs 1 and 2 used different numerical procedures for computing the unsteady aerodynamics, i.e. a doublet-lattice method for the unsteady aerodynamic prediction and a Laguerre variation of the classical K-method for the flutter solution.

Table 4.1 Flutter Results Using Linear Aerodynamics at M = 0.9.

Aerodynamic Model or Methods		Flutter Speed (KCAS)	Flutter Frequency (Hz)
Flight test (on set of flutter speed)		585.4	9.5
Denegri's DLM results (Aerodynamic Model #1: Wing + tip launcher only, non matched point)	g = 0%	745	9.37
	g = 1%	807	9.39
Aerodynamic Model #1: Wing + tip launcher only, (non matched point)	g = 0%	752	9.36
	g = 1%	831	9.36
Aerodynamic Model #2: Whole aircraft without underwing stores (matched point)	g = 0%	483	9.56
	g = 1%	517	9.55
Aerodynamic Model #3: Whole aircraft with stores (matched point)	g = 0%	478	9.57
	g = 1%	513	9.55
Aerodynamic Model #3: Whole aircraft with stores but without rigid body modes (matched point)	g = 0%	486	9.56
	g = 1%	522	9.55

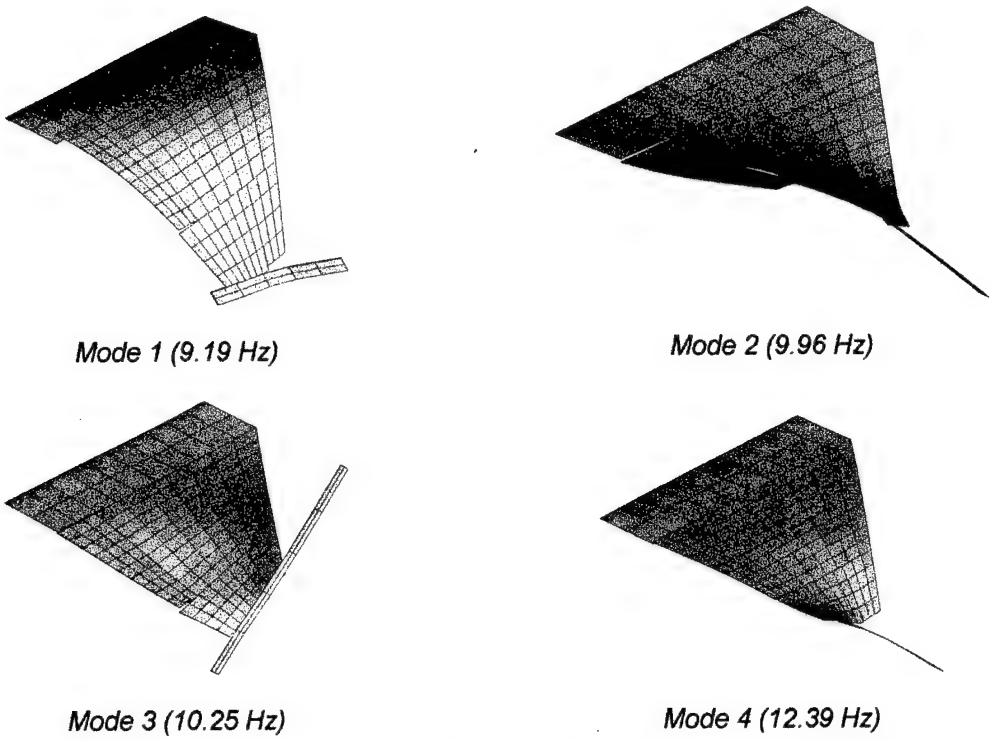


Figure 4.2 Vibration Modes of Aerodynamic Model #1.

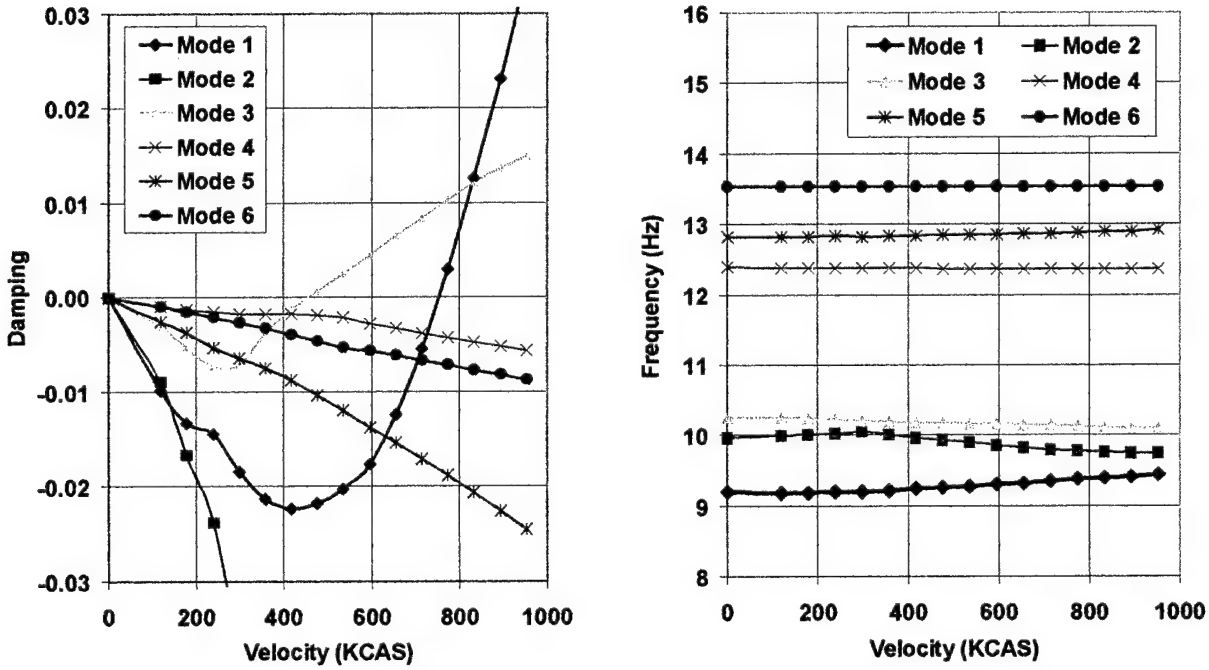


Figure 4.3 The Flutter V-g and V-f plots for Wingtip Launcher only Model at M = 0.9 Using the Linear Aerodynamic Approach.

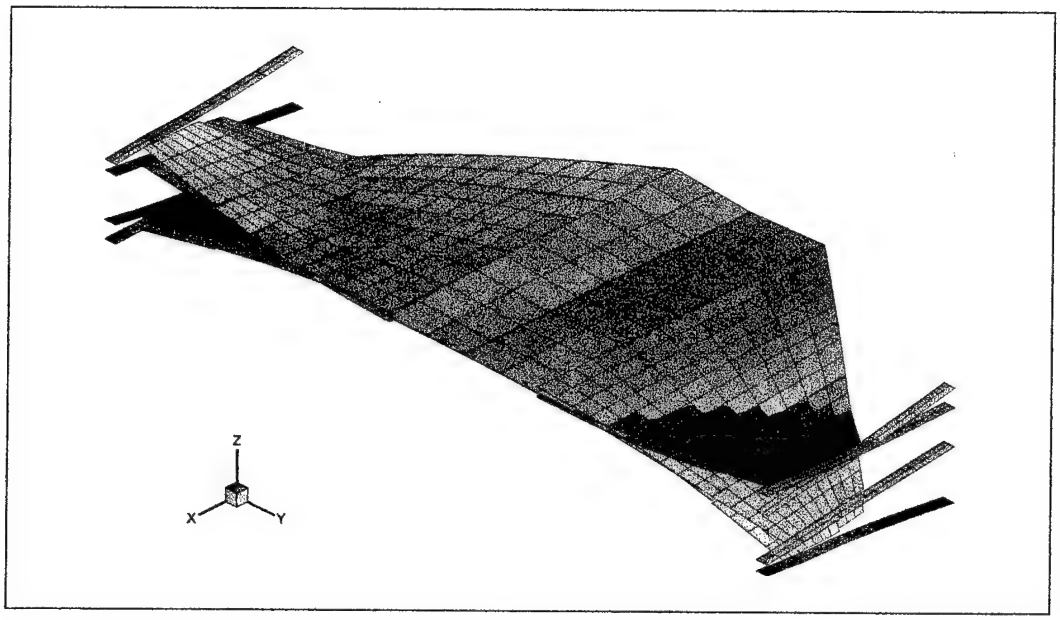


Figure 4.4 The Flutter Mode Shape at V_f = 752 KCAS and f_f = 9.36 Hz of the Wing-Tip Launcher Only Model.

4.2.2 Aerodynamic Model #2

The flutter calculation was repeated using the aerodynamic model #2, i.e. the whole aircraft without underwing stores. The flutter calculation using the matched point method gave the flutter speed/frequency at $V_f = 483$ KCAS / $f_f = 9.56$ Hz. Note that there is no second critical speed in this second model. If the structural damping is assumed to be g = 1.0%, than the flutter speed and frequency becomes $V_f = 517$ KCAS and $f_f = 9.55$ Hz. The result for this configuration shows that the inclusion of the fuselage and empenage aerodynamic model improves the result, i.e. closer to the flight test data.

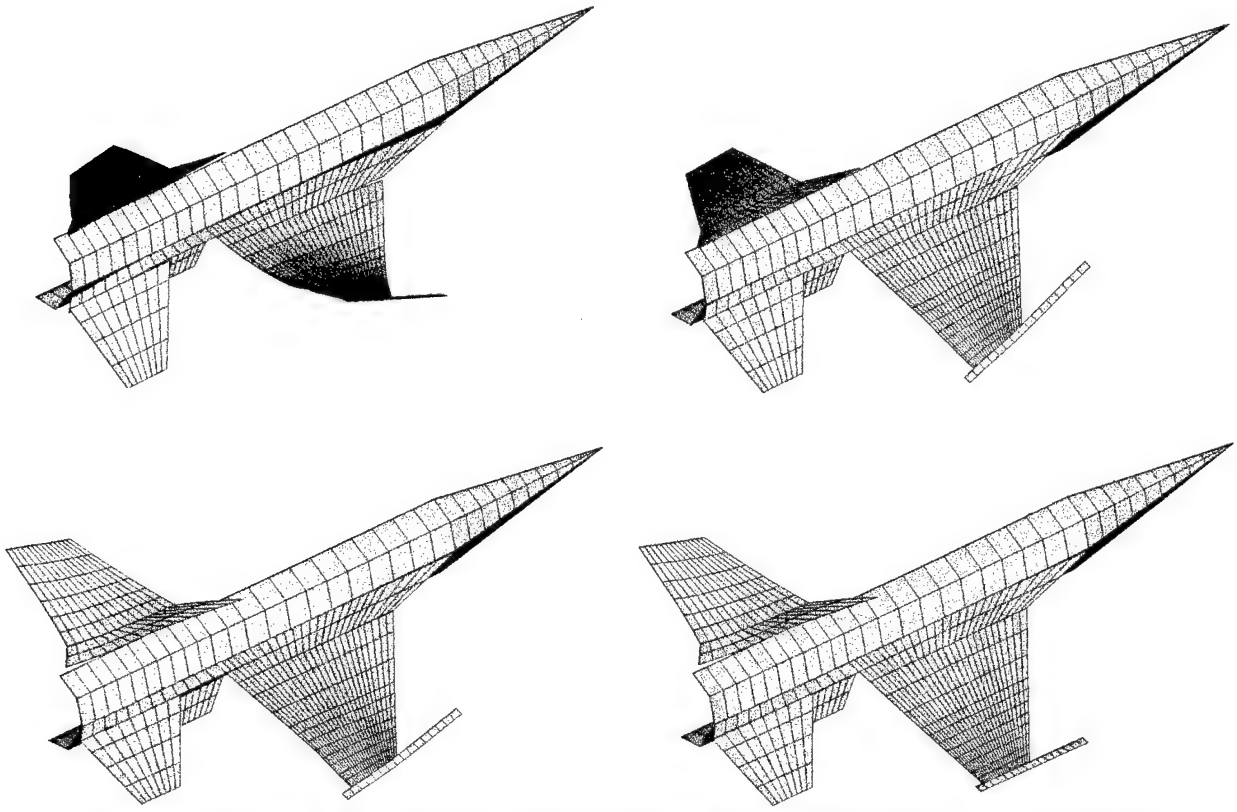


Figure 4.5 Vibration Modes of the Aircraft Model without Underwing Stores

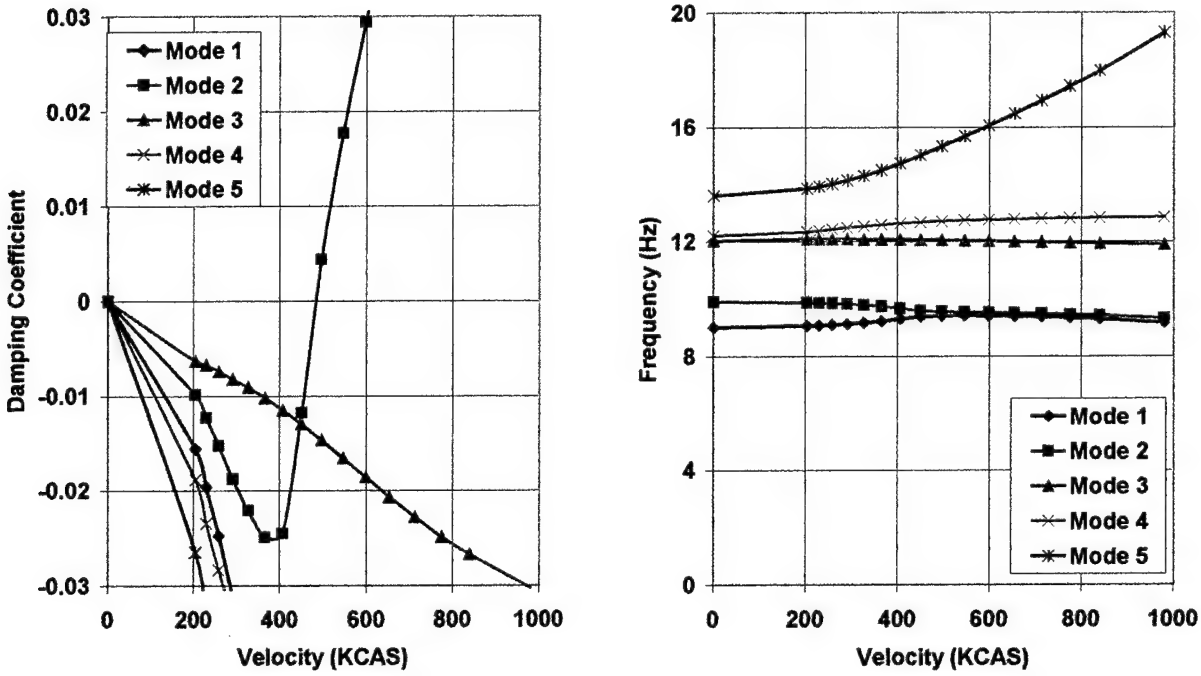


Figure 4.6 The Flutter V-g and V-f Plots for the Whole Aircraft Model without Underwing Stores at M = 0.9 Using the Linear Aerodynamic Approach.

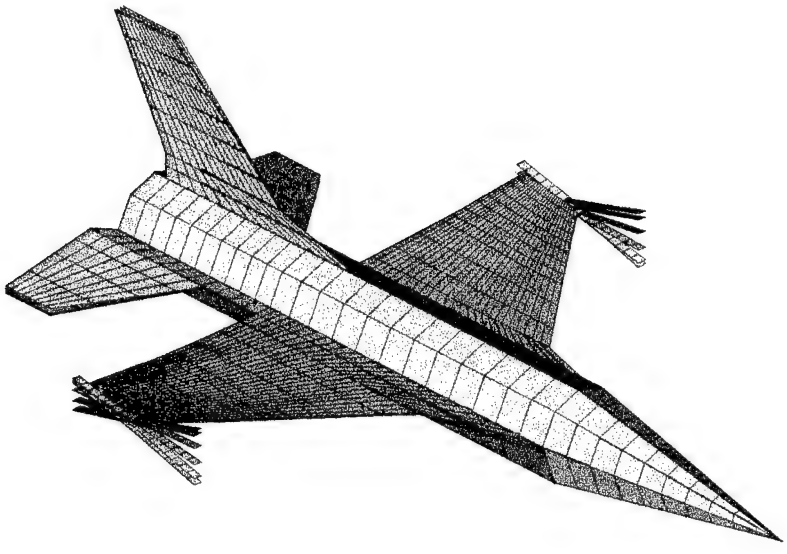


Figure 4.7 The Flutter Mode Shape of the Aircraft Model Without Underwing Stores.

4.2.3 Aerodynamic Model #3, M = 0.90

The flutter calculation was repeated using the aerodynamic model #3, i.e. the whole aircraft with underwing stores. The natural mode shapes are shown in Figure 4.8. The flutter calculation using the matched point method gave the flutter speed/frequency at V_f = 486 KCAS / f_f = 9.56 Hz. Note that there is no second critical speed in this third model. If the structural damping is assumed to be g = 1.0% than the flutter speed and frequency becomes V_f = 522 KCAS and f_f = 9.55 Hz. Clearly, the result for this configuration is closer to the flight test data as shown in Table 4.1.

All of the previous calculations on the classical flutter did not include the structural rigid body modes. If the anti-symmetric rigid body modes are included to the whole aircraft with store model, the similar procedures gave the flutter speed / frequency at V_f = 478 KCAS / f_f = 9.57 Hz for g=0%, and V_f = 513 KCAS / f_f = 9.55 Hz for g = 1.0%. These results are very close to the results of the model without rigid body modes. Therefore, for the classical flutter of the present case, the influence of the rigid body modes is not significant. Figure 4.9 shows the flutter V-g and V-f diagrams for aerodynamic model #3. The flutter modes for several time steps is presented in Fig 4.10.

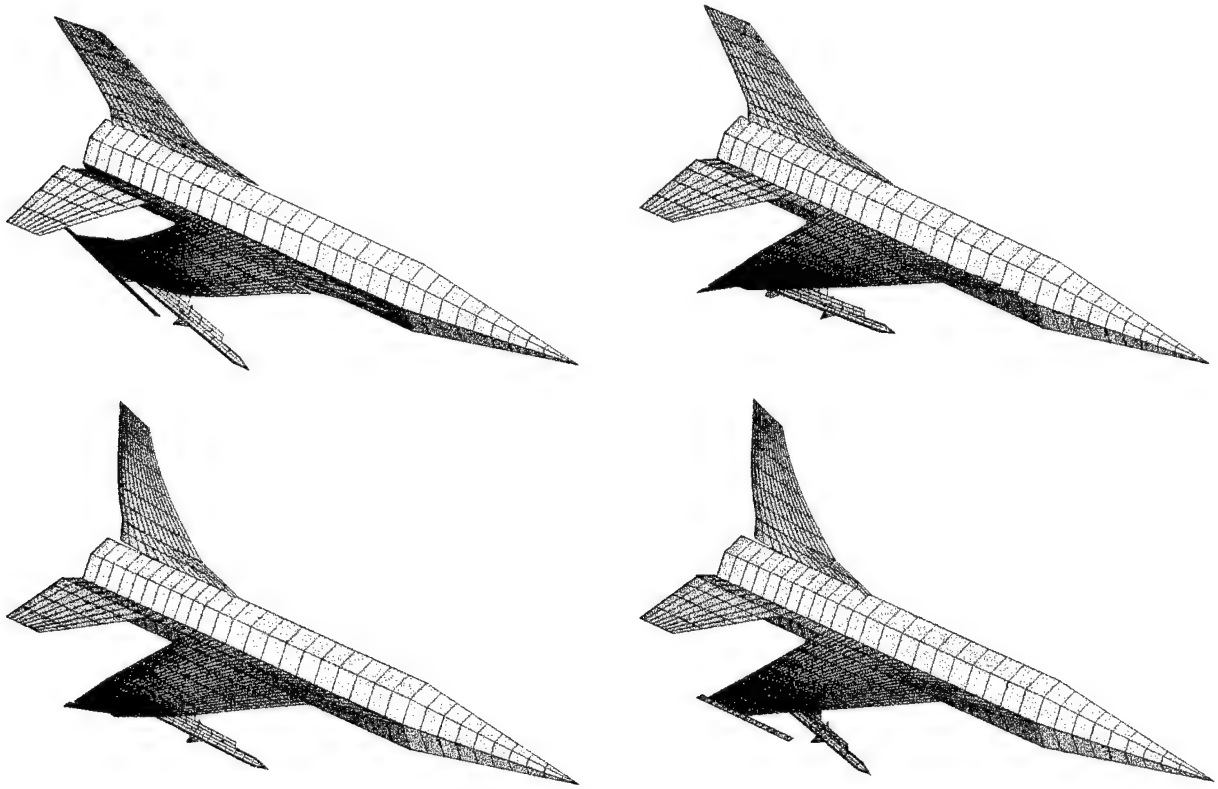


Figure 4.8 Vibration Modes of the Aircraft Model with Underwing Stores

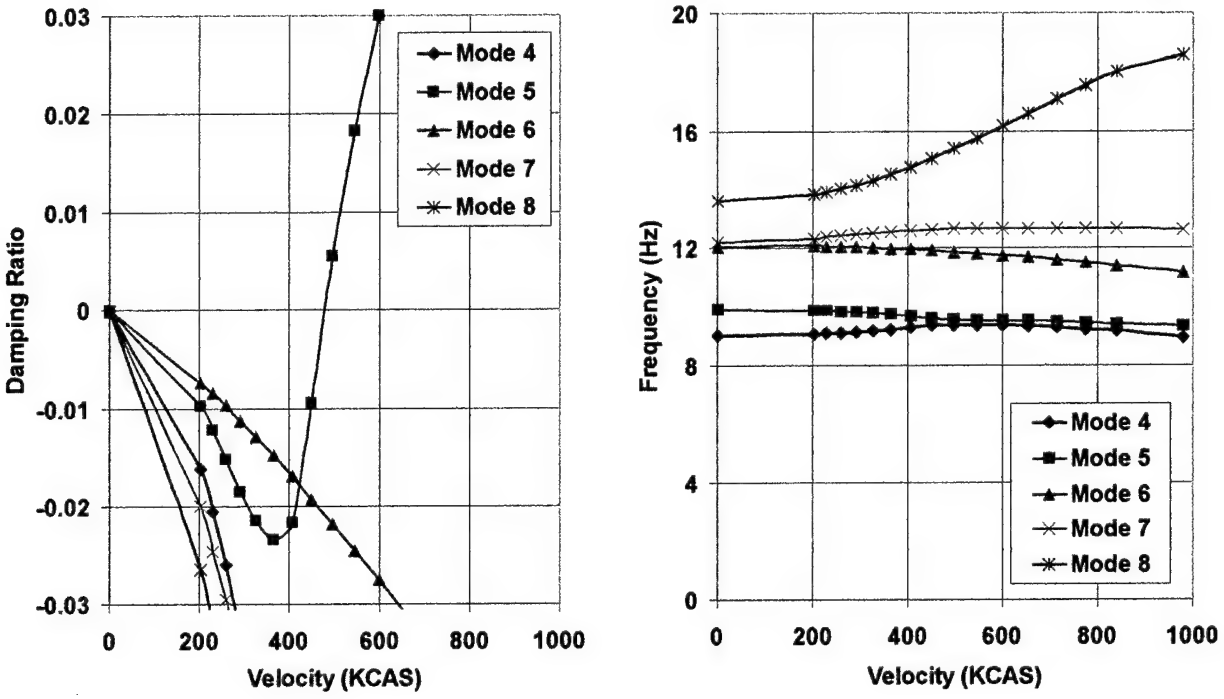


Figure 4.9 The Flutter V-g and V-f plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 using the Linear Aerodynamic Approach.

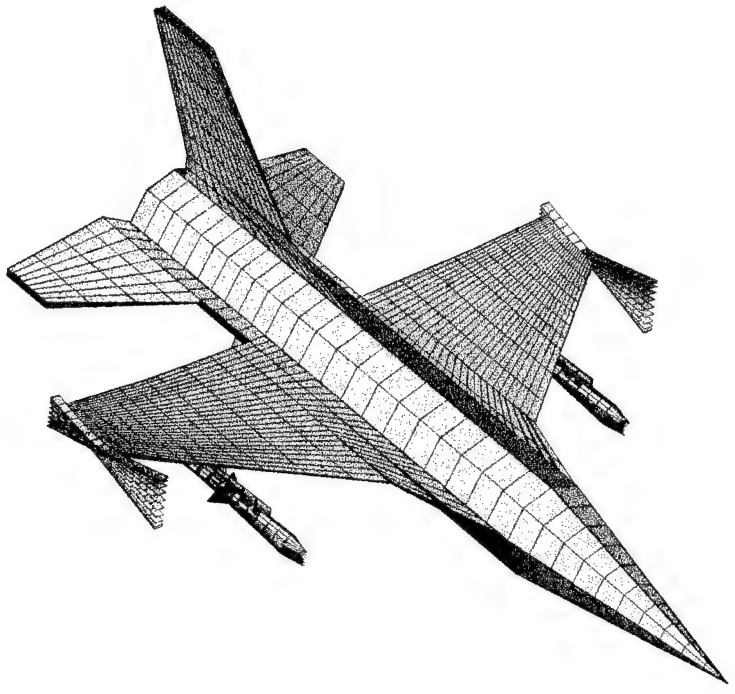


Figure 4.10 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores at M = 0.9.

4.2.4. Aerodynamic Model #3. Mach 0.8 – 1.05

The flutter calculations for M = 0.90 showed improvement on the solution results if a more refined aerodynamic model is used. However, previous results does not give a direct correlation between the flutter prediction and the flight test data. Note that, to indicate the flutter onset, the flight test data presents the measure acceleration response level in terms of Mach numbers and altitudes. Therefore, in order to correlate the numerical predictions with the flight test data, the calculation was repeated for several Mach numbers, including M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient as a function of Mach number for each altitude as shown in Fig 4.11. Note that the correlation of the flutter prediction with the altitude is automatically generated by using the matched point option of the g-method.

The critical speed and frequency are given in Table 4.2. The results presented in Fig 4.11. shows that

- Linear aerodynamic approach (ZONA6/ZONA7) predicts explosive damping of the unstable mode in all altitudes.
- For the altitude lower than 15,000 ft, the flutter onset Mach number of the flight test data was correlated very well with the linear aerodynamic approach if the structural damping is assumed to be 1%.
- For altitudes of 15,000 ft and higher, the onset Mach number of the flight test data occurred near M = 0.98 and 1.02 where the nonlinearity effect of the transonic aerodynamic is significant. Therefore, the linear aerodynamic approach gives a higher prediction of the onset Mach number for these altitudes.

Table 4.2 Critical Speed and Frequency Using the Linear Aerodynamic Approach (ZONA6/ZONA7)

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	485	9.58
	1.0	521	9.56
0.90	0.0	486	9.56
	1.0	522	9.55
0.95	0.0	479	9.56
	1.0	515	9.55
0.98	0.0	500	9.58
	1.0	556	9.58
1.05	0.0	490	9.58
	1.0	517	9.58

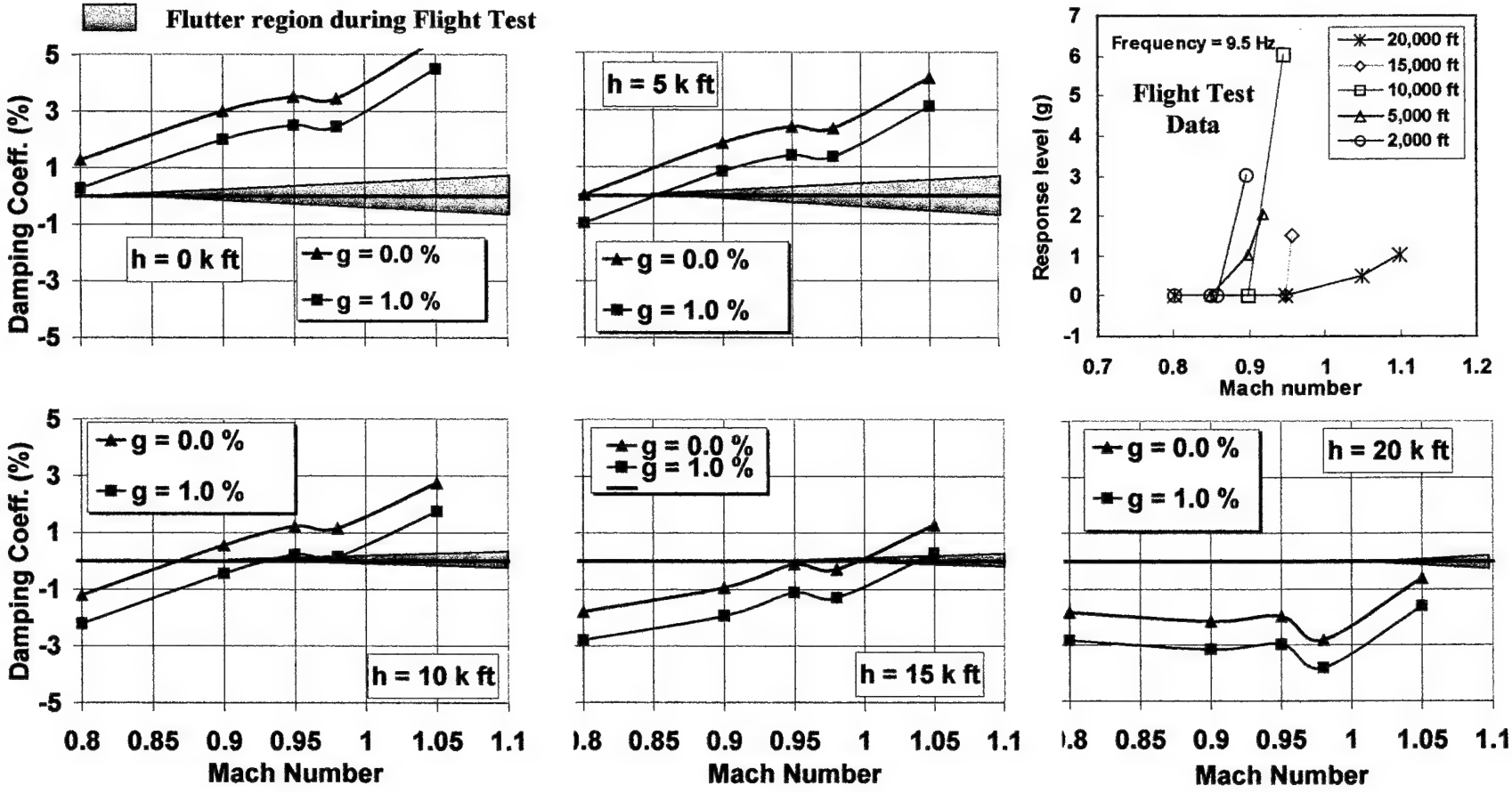


Fig 4.11 Correlation between the Flutter Prediction using the Linear Aerodynamic Approach (ZONA6/ZONA7) with Flight Test Data of the Classical Flutter Case.

4.3 Nonlinear Aerodynamic Approach

The flight test for the classical flutter configuration indicated that the aeroelastic instability for this case occurred between 0.85 and 1.1, *i.e.* in transonic regime where the nonlinear behavior of the aerodynamic flow may significantly influence the critical speed. To investigate the flutter calculation in this transonic regime, a nonlinear aerodynamic approach based on the ZTAIC method was used for the prediction of the unsteady aerodynamic data. The steady aerodynamic data was provided by Dr. Charles Denegri of Eglin Air Force Base as shown in Section 3. The flutter calculation was conducted for the whole aircraft with stores. Mach numbers ranged from 0.80 to 1.05. Rigid body modes were included in the structural dynamic calculations.

4.3.1 Aerodynamic Model #3 at M = 0.90

The flutter calculation for M = 0.90 using the matched point method gave the flutter speed/frequency at V_f = 501 KCAS / f_f = 9.58 Hz. Note that there is no second critical speed in this third model. If the structural damping is assumed to be g = 1.0%, the flutter speed and frequency becomes V_f = 538 KCAS and f_f = 9.56 Hz. Compared to the results based on the linear aerodynamic approach given in Table 4.1, the present result using the nonlinear aerodynamic approach is closer to the flight test data. Figure 4.12 shows the V-g and V-f plot for Mach 0.90. The associated flutter mode is presented in Fig 4.13.

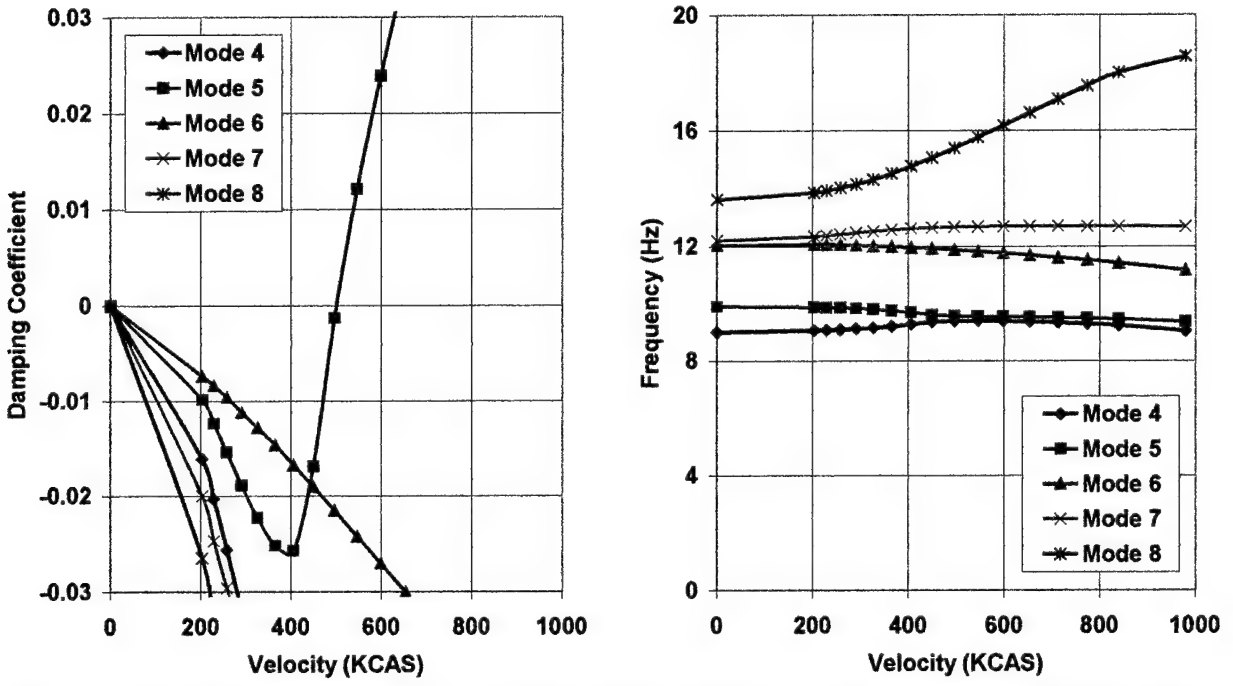


Figure 4.12 The Flutter V-g and V-f plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using The Nonlinear Aerodynamic Approach.

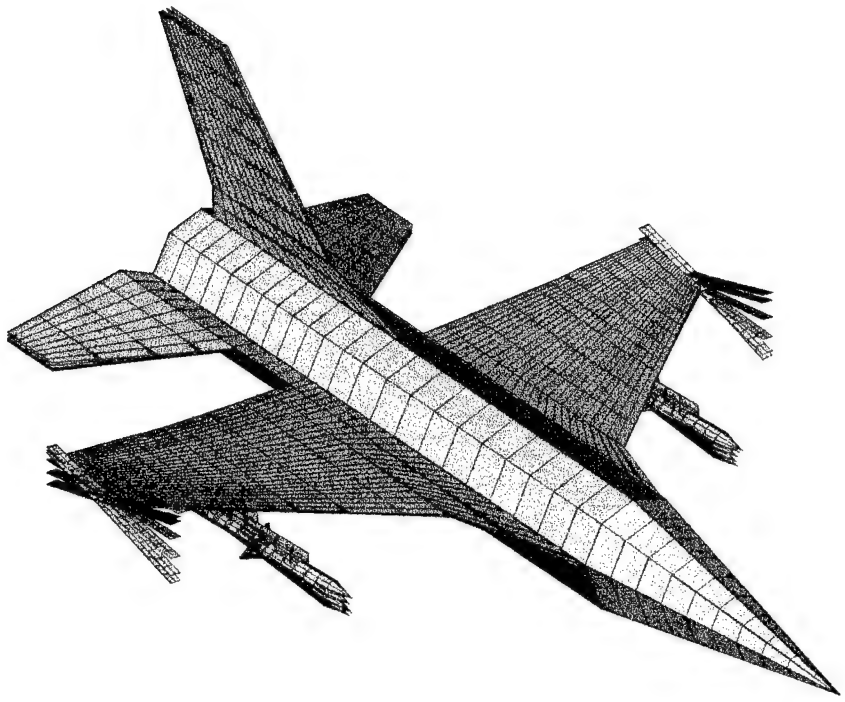


Figure 4.13 The Flutter Mode Shape of The Whole Aircraft Model with Underwing Stores at M = 0.9 Calculated Using The Non-Linear Aerodynamic Method.

4.3.2 Aerodynamic Model #3 at M = 0.80 – 1.05

In order to correlate the numerical predictions with the flight test data, the calculation for the nonlinear aerodynamic approach was repeated for several Mach numbers, namely M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient and Mach number as well as the altitudes. The critical speed and frequency for each Mach number are given in Table 4.3. The results presented in Fig 4.14. shows that:

- ZTAIC, i.e. the nonlinear aerodynamic approach, predicts explosive damping of the unstable mode in all altitudes.
- In the post-flutter region, the non-linearity induced stable damping (from either structures or aerodynamics) can not nullify the explosive unstable damping, leading to flutter.
- ZTAIC results indicate that the onset of flutter is very sensitive to the linear structural damping.
- Overall, ZTAIC predicts the flutter onset Mach number better than the linear aerodynamic approach for all altitudes.

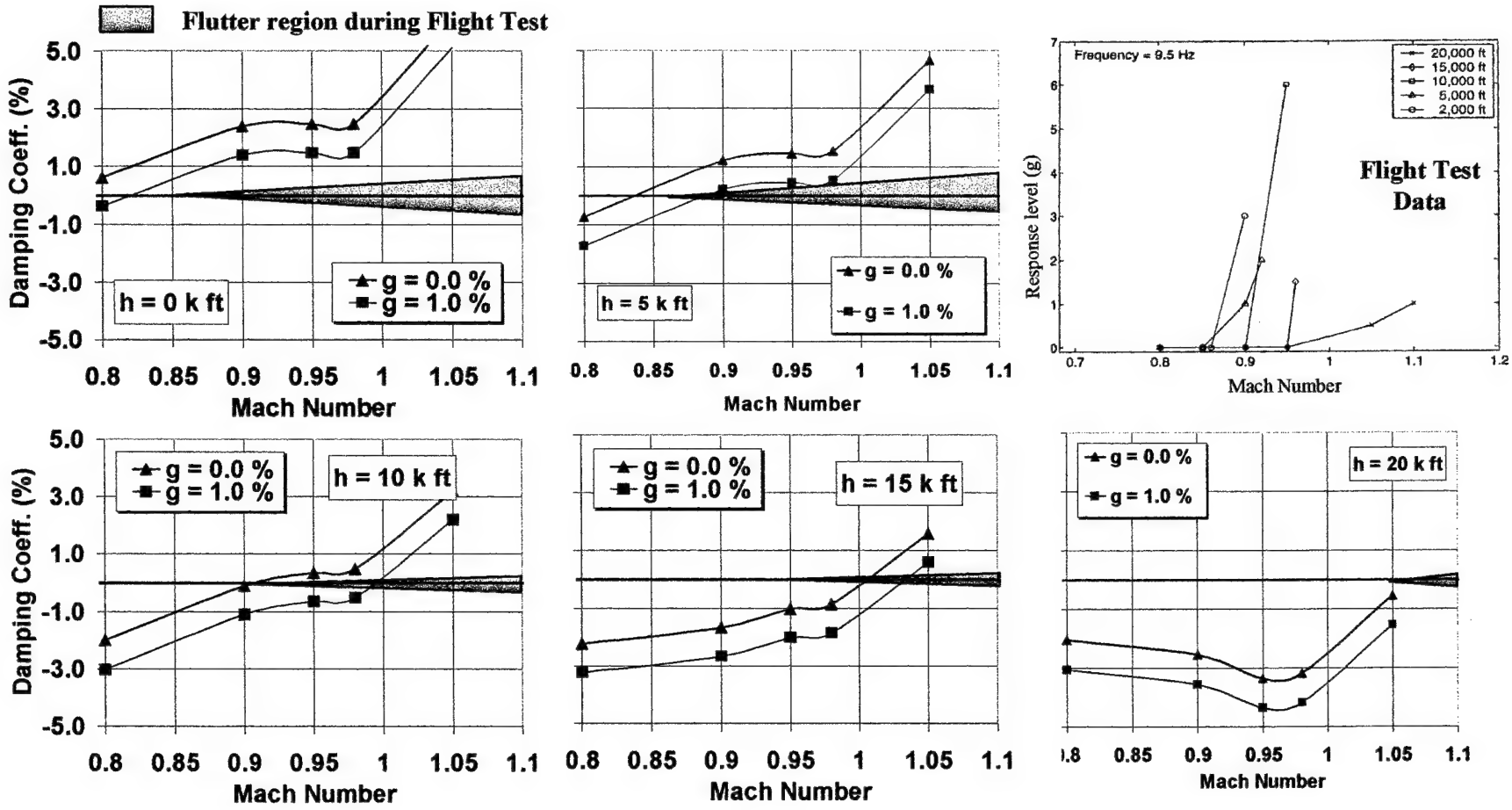


Figure 4.14 Correlation between the Flutter Prediction using the Nonlinear Aerodynamic Approach (ZTAIC) and the Flight Test Data.

Table 4.3 Critical speed and Frequency Using the Nonlinear Aerodynamic Approach (ZTAIC).

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	511	9.61
	1.0	549	9.60
0.90	0.0	501	9.58
	1.0	538	9.56
0.95	0.0	512	9.58
	1.0	555	9.58
0.98	0.0	522	9.59
	1.0	567	9.60
1.05	0.0	486	9.59
	1.0	510	9.59

SECTION 5

CORRELATION OF THE F-16 / STORE TYPICAL LCO PREDICTIONS WITH FLIGHT TEST DATA

5.1 Flight Test Result and Previous Numerical Prediction

Reference 1 reported that the so called typical limit cycle oscillation (LCO) occurred during the flight test of F-16A Block 15 with the store configuration described in Table 3.1. The instability response was characterized by a gradual onset of sustained limited amplitude wing oscillations where the oscillation amplitude progressively increases with increasing Mach number and dynamic pressure (Ref 1). The measured oscillatory wing tip response during level flight at five altitude is shown in Figure 3.2. Reference 1 described that the dynamic aeroelastic characteristic of the configuration were well behaved. The instability response was anti-symmetric at a frequency of 7.8 Hz for all altitudes.

An attempt to predict this typical LCO case has been conducted by Denegri in Refs 1 and 18. The calculation was performed at M = 0.90. The aerodynamic model used in Refs 1 and 18 is an isolated wing with tip launcher only, *i.e.* the same as the aerodynamic model # 1 of the present work as shown in Fig 5.1. No aerodynamic modeling of fuselage, empenage and underwing stores is included. The only influence of the fuselage, empenage and stores considered in the flutter analysis is their effect on structural modal characteristics. The flutter calculation was conducted using the non-matched method. The critical speed and its frequency are V_f = 312 KCAS and f_f = 8.1 Hz for g = 0%, and V_f = 312 KCAS and f_f = 8.1 Hz for g = 1% (Ref 18). The result indicates that the flutter frequency was correlated well with the flight test data. However, the calculated flutter speed was lower than the flight test data.

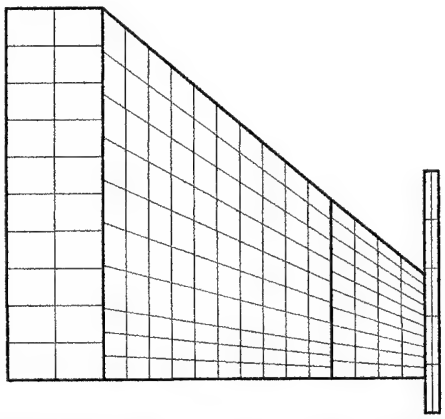


Figure 5.1 Aerodynamic Model # 1 for the typical LCO case

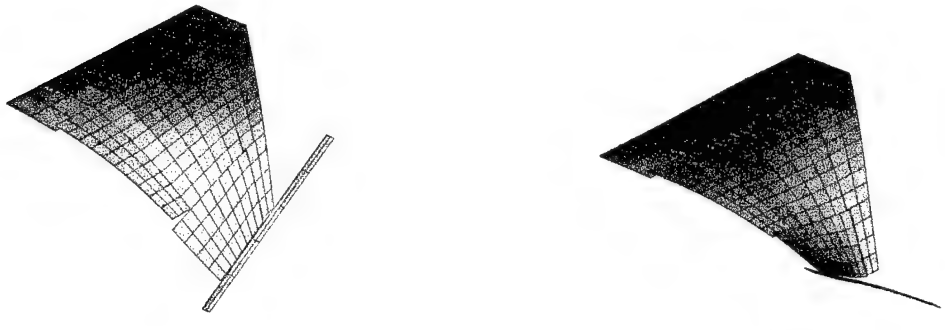
5.2. Linear Aerodynamic Approach

5.2.1 Aerodynamic Model # 1

The first aerodynamic model of the present work is the isolated wing with tip launcher (Figure 5.1), *i.e* the same as the model used in Refs 1 and 18. Figure 5.2 shows the first four natural (undamped) mode shapes. Employing a non-matched point flutter analysis of ZAERO at M= 0.90 and sea level density, the critical speed was found to be V_f = 347 KCAS and flutter frequency was f_f = 8.08 Hz for the structural damping g = 0%. For the structural damping g = 1%, the critical speed and frequency are V_f = 531 KCAS and f_f = 8.09 Hz, respectively. These results are very close to the analysis results in Refs 1 and 18 as shown in Table 5.1 and Fig 5.3. Figure 5.4 shows the flutter mode shape for V_f = 531 KCAS at several time steps. The V-g and V-f plots of the present flutter analysis given in Fig 5.4 show similar results to Fig 12 of Ref 17.

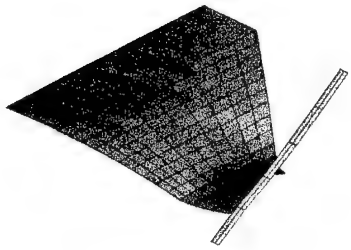
Table 5.1 Flutter Results Using Linear Aerodynamics at M = 0.9.

Aerodynamic Model or Methods		Flutter Speed (KCAS)	Flutter Frequency (Hz)
Flight test (on set of flutter speed)		530	7.8
Denegri's DLM results (Aerodynamic Model # 1: Wing + tip launcher only, non matched point)	g = 0%	312	8.10
	g = 1%	494	8.06
Aerodynamic Model # 1: Wing + tip launcher only, (non matched point)	g = 0%	347	8.08
	g = 1%	531	8.09
Aerodynamic Model # 2: Whole aircraft without underwing stores (matched point)	g = 0%	413	8.01
	g = 1%	492	8.00
Aerodynamic Model # 3: Whole aircraft with stores (matched point)	g = 0%	482	7.96
	g = 1%	593	7.91
Aerodynamic Model # 3: Whole aircraft with stores but without rigid body modes (matched point)	g = 0%	483	7.96
	g = 1%	601	7.91

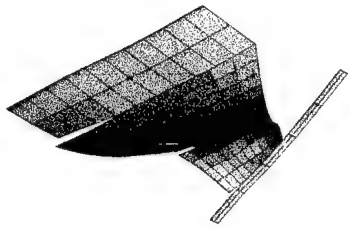


Mode 1 (7.89 Hz)

Mode 2 (8.15)



Mode 3 (10.06)



Mode 4 (10.31)

Figure 5.2 Vibration Modes of Aerodynamic Model # 2.

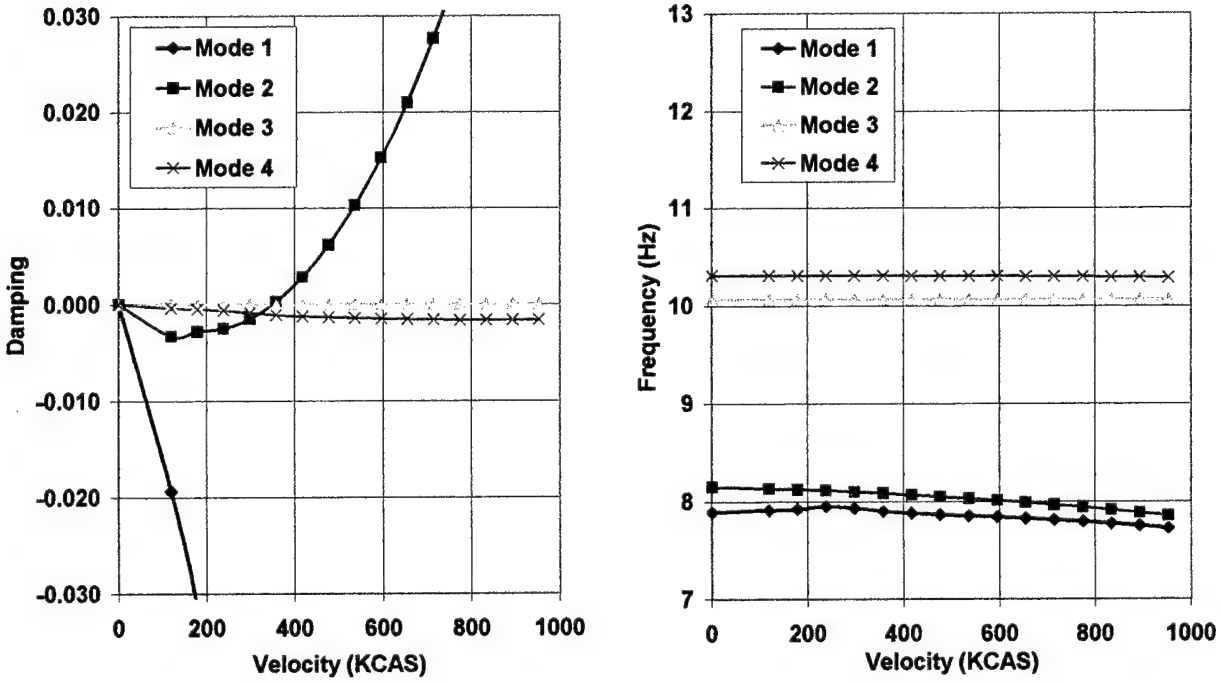


Figure 5.3 The Flutter V-G and V-F Plots for Wing-Tip Launcher Only Model at M = 0.9 Using The Linear Aerodynamic Approach.

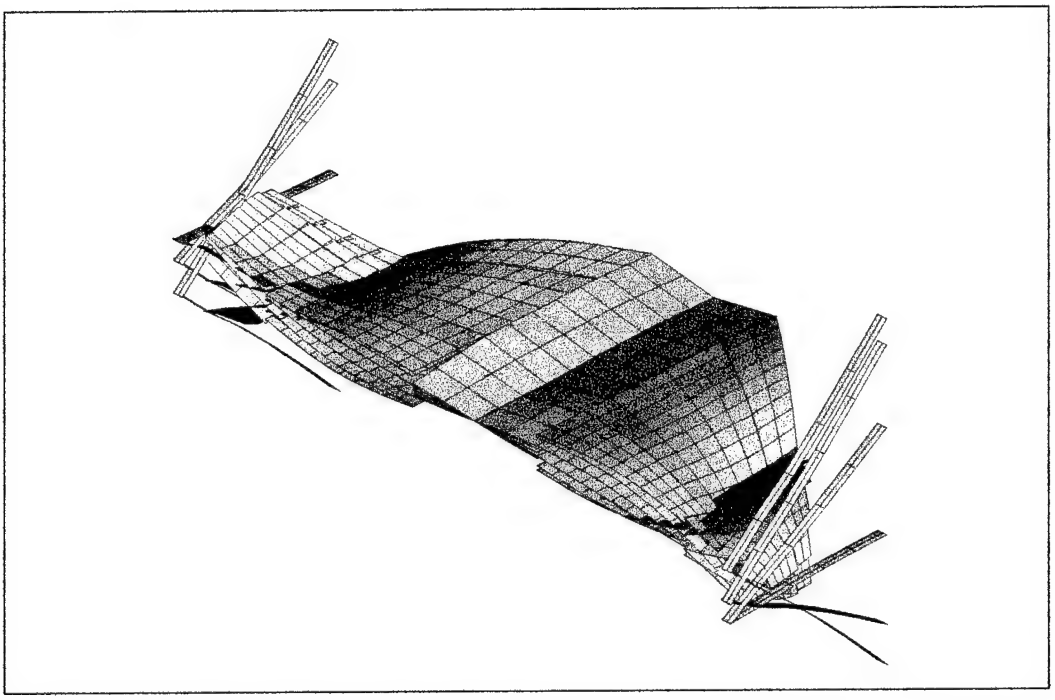
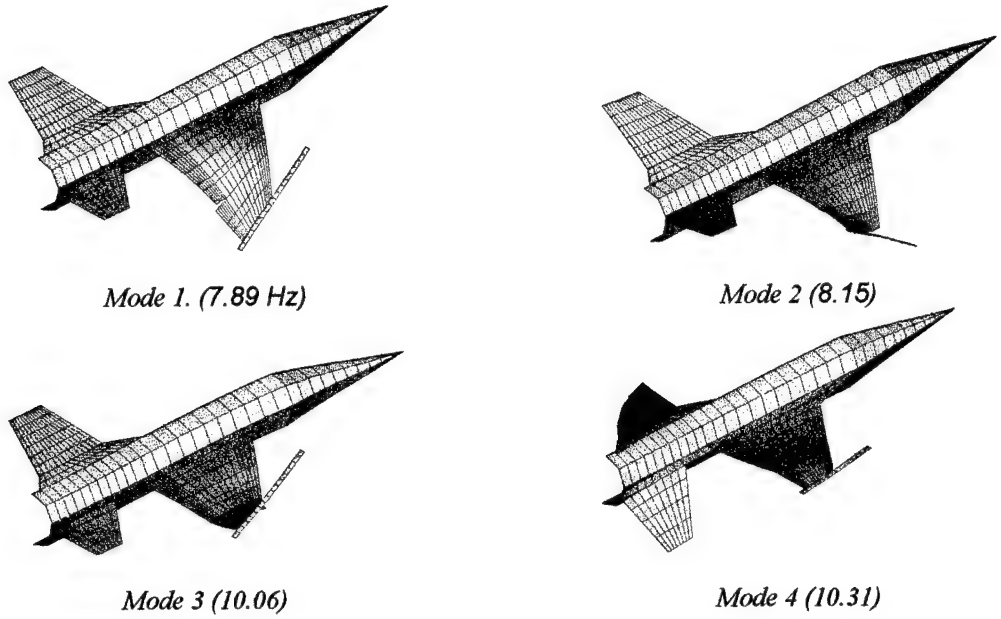


Figure 5.4 The Flutter Mode Shape of The Wingtip Launcher Only Model.

5.2.2. Aerodynamic Model # 2

The flutter calculation was repeated using the aerodynamic model # 2, i.e. the whole aircraft without underwing stores. The flutter calculation using the matched point method gave the flutter speed/frequency at V_f = 413 KCAS / f_f = 8.09 Hz for g = 0%, and V_f = 492 KCAS / f_f = 8.0 Hz for g = 1%. The result for this configuration shows that the inclusion of the fuselage and empenage aerodynamic model improves the result, i.e. closer to the flight test data.



Mode 1. (7.89 Hz) *Mode 2 (8.15)*

Mode 3 (10.06) *Mode 4 (10.31)*

Figure 5.5 Vibration Modes of the Aircraft Model without Underwing Stores.

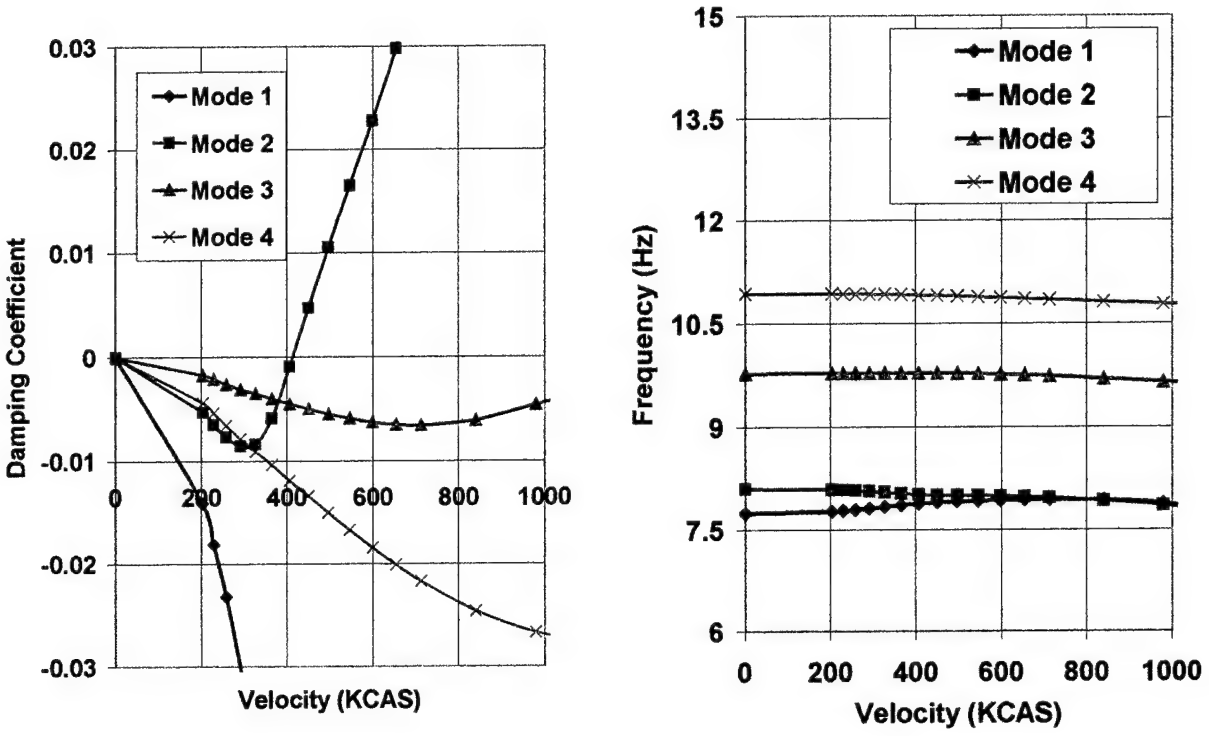


Figure 5.6 The Flutter V-G and V-F Plots for the Whole Aircraft Model without Underwing Stores at M = 0.9 Using the Linear Aerodynamic Approach.

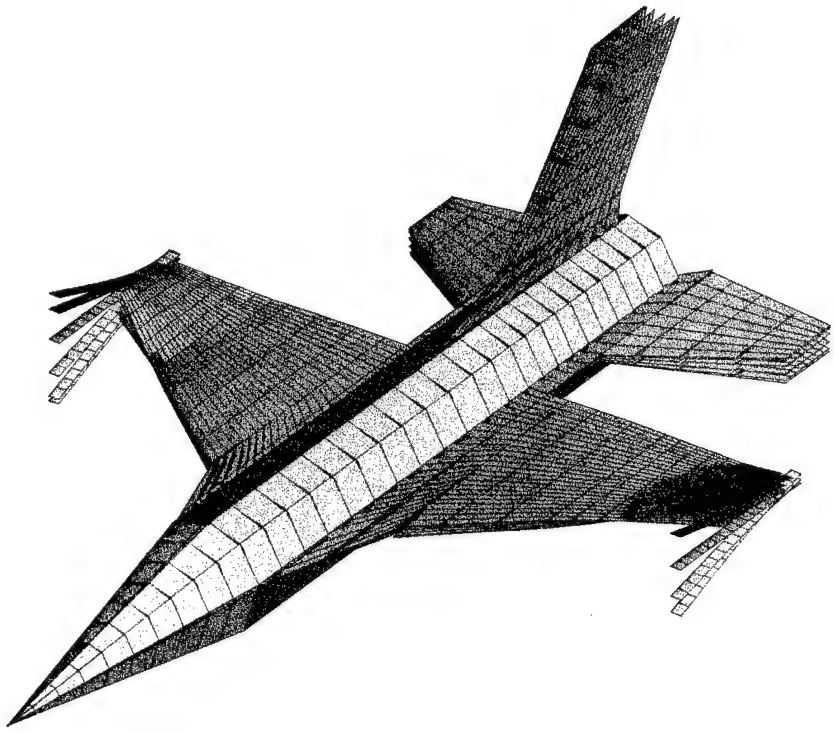


Figure 5.7 The Flutter Mode Shape of the Aircraft Model without Underwing Stores.

5.2.3. Aerodynamic Model # 3 at M = 0.90

The flutter calculation was repeated using the aerodynamic model # 3, i.e. the whole aircraft with underwing stores. The natural mode shapes are shown in Figure 5.8. The flutter calculation using the matched point method gave the flutter speed/frequency at V_f = 483 KCAS / ff = 7.96 Hz. If the structural damping is assumed to be g = 1.0% than the flutter speed and frequency becomes V_f = 601 KCAS and ff = 7.91 Hz.

All of the previous calculations on the typical LCO case did not include the structural rigid body modes. If the anti-symmetric rigid body modes are included to the whole aircraft with store model, the similar procedures gave the flutter speed / frequency at V_f = 482 KCAS / ff = 7.96 Hz for g=0%, and V_f = 593 KCAS / ff = 7.91 Hz for g = 1.0%. These results are very close to the results of the model without rigid body modes. Therefore, for the typical LCO of the present case, the influence of the rigid body modes is not significant. Figure 5.9 shows the flutter v-g and V-f diagram for the aerodynamic model # 3. The flutter modes for several time steps is presented in Fig 5.10.

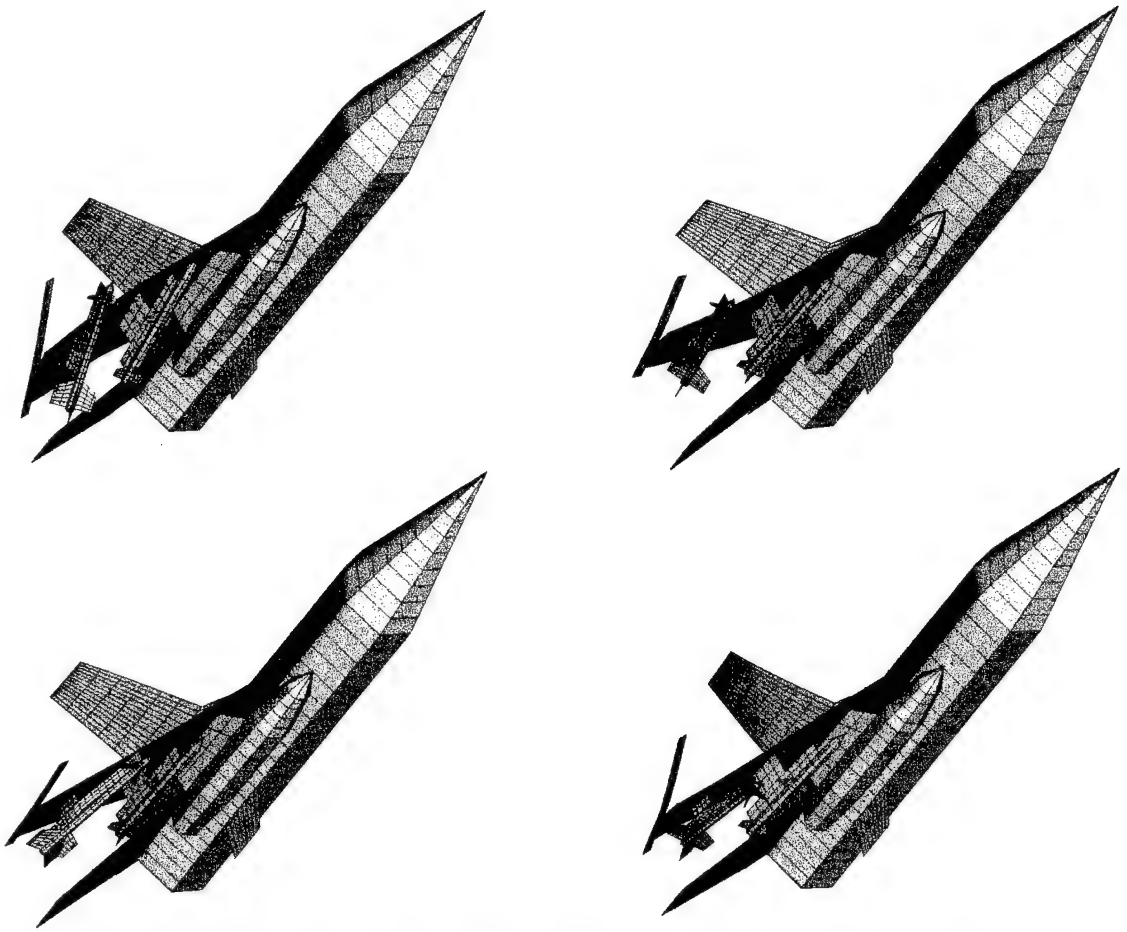


Figure 5.8 Vibration Modes of the Aircraft Model with Underwing Stores

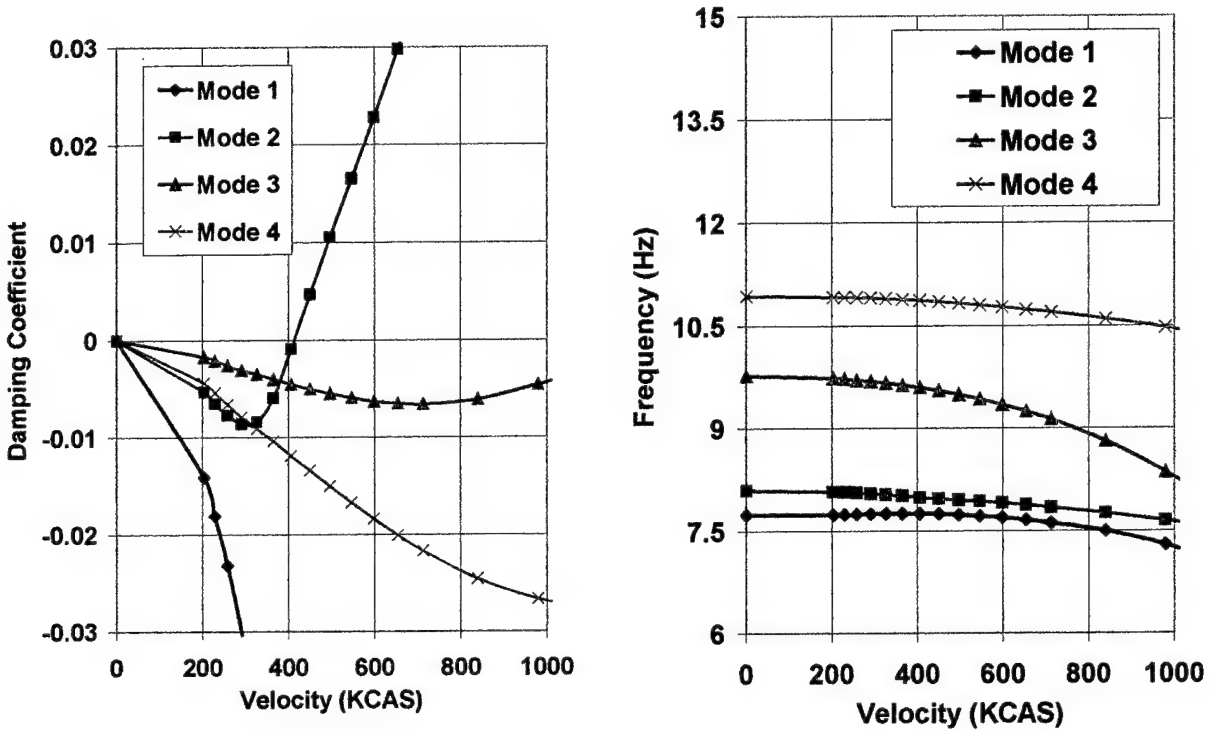


Figure 5.9 The Flutter V-g and V-f plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using the Linear Aerodynamic Approach.

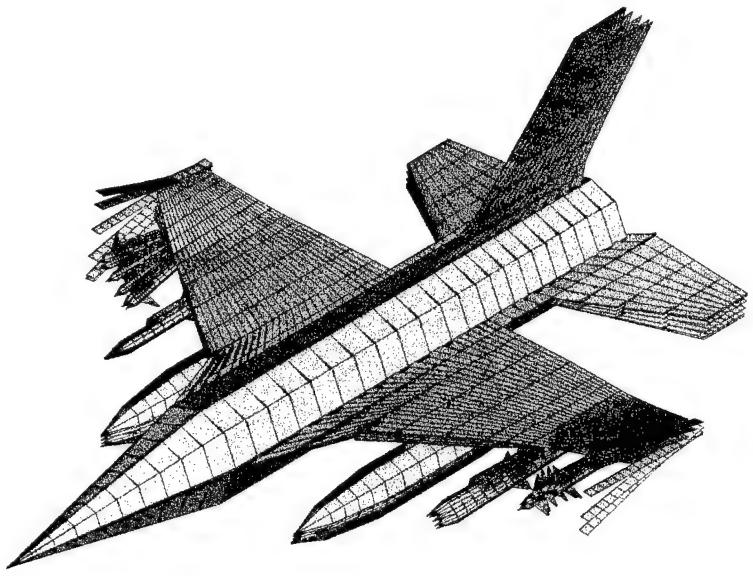


Figure 5.10 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores At M = 0.9.

5.2.5. Aerodynamic Model # 3 at Mach 0.8 – 1.05

The flutter calculations for M = 0.90 showed improvement on the solution results if a more refined aerodynamic model is used. However, previous results does not give a direct correlation between the flutter prediction and the flight test data. Note that, to indicate the flutter onset, the flight test data presents the measure acceleration response level in terms of Mach numbers and altitudes. Therefore, in order to correlate the numerical predictions with the flight test data, the calculation was repeated for several Mach numbers, including M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient as a function of Mach number for each altitude. The critical speed and frequency for each Mach number are given in Table 5.2. Note that the correlation of the flutter prediction with the altitude is automatically generated by using the matched point option of the g-method.

The results presented in Fig 5.11. indicates that :

- at sea level, the linear aerodynamic approach gives a lower mach number than onset mach number of the flight test LCO data.
- at higher altitudes, the linear aerodynamic approach gives a higher mach number than the flight test data.

Table 5.2 Critical Speed and Frequency Using the Linear Aerodynamic Approach (ZONA6/ZONA7)

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	534	7.95
	1.0	654	7.90
0.90	0.0	482	7.96
	1.0	593	7.91
0.95	0.0	431	7.97
	1.0	541	7.92
0.98	0.0	429	7.96
	1.0	526	7.92
1.05	0.0	450	7.93
	1.0	522	7.89

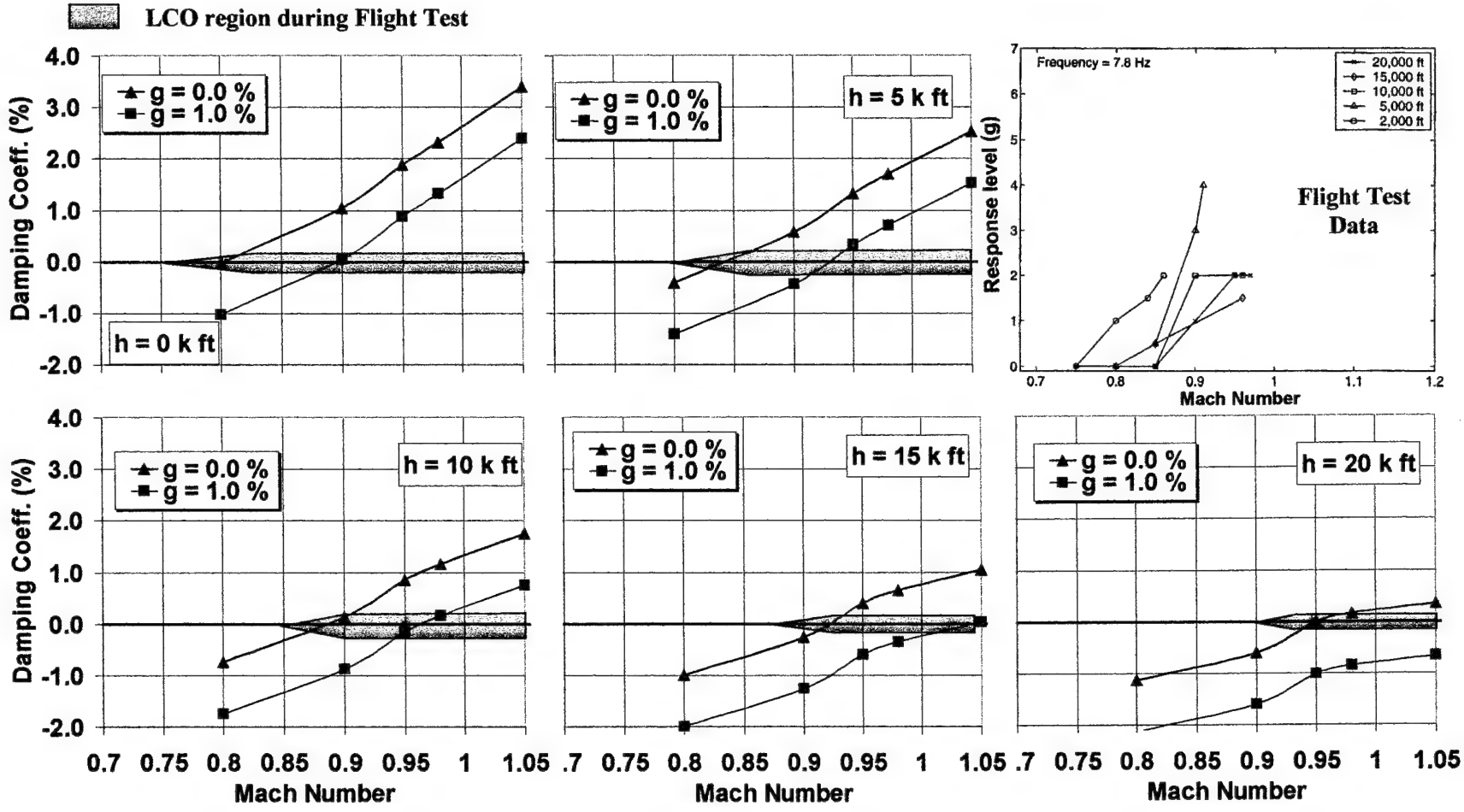


Fig 5.11 Correlation between the Flutter Prediction Using the Linear Aerodynamic Approach (ZONA6/ZONA7) with Flight Test Data.

5.3. Nonlinear Aerodynamic Approach

The flight test for the typical LCO configuration indicated that the aeroelastic instability for this case occurred between 0.75 and 1.1, *i.e.* in transonic regime where the nonlinear behavior of the aerodynamic flow may significantly influence the critical speed. To investigate the flutter calculation in this transonic regime, a nonlinear aerodynamic approach based on the ZTAIC method was used for the prediction of the unsteady aerodynamic data. The steady aerodynamic data was provided by Denegri of Eglin Airforce Base as shown in Section 3. Flutter calculation was conducted to the whole aircraft with stores for Mach numbers ranging between 0.80 and 1.05. The rigid body modes were included in the structural dynamic calculations.

5.3.1 Aerodynamic Model # 3 at M = 0.90

The flutter calculation for M = 0.90 using the matched point method gave the flutter speed/frequency at V_f = 468 KCAS / f_f = 7.97 Hz. Note that there is no second critical speed in this third model. If the structural damping is assumed to be g = 1.0%, the flutter speed and frequency becomes V_f = 588 KCAS and f_f = 7.93 Hz. Compare to the results based on the linear aerodynamic approach given in Table 5.1, the present result using the nonlinear aerodynamic approach is closer to the flight test data. Figure 5.12 shows the V-g and V-f plot for Mach 0.90. The associated flutter mode is presented in Fig 5.13.

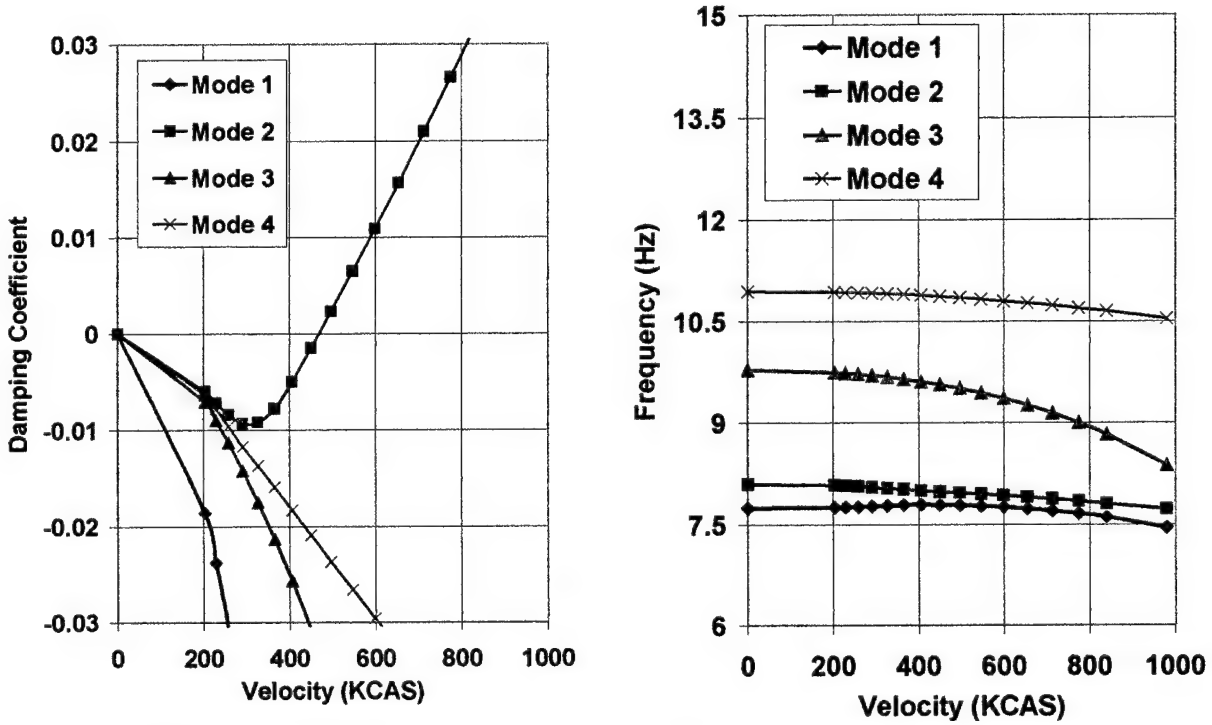


Figure 5.12 The Flutter V-G and V-F Plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using the Nonlinear Aerodynamic Approach.

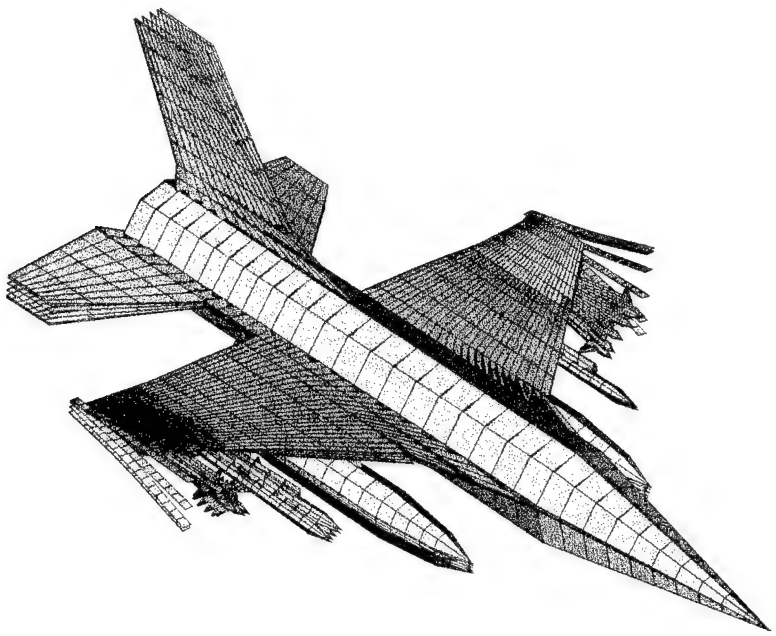


Figure 5.13 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores at M = 0.9 Calculated Using the Non Linear Aerodynamic Method

5.3.2. Aerodynamic Model # 3 at M = 0.80 – 1.05

In order to correlate the numerical predictions with the flight test data, the calculation for the nonlinear aerodynamic approach was repeated for several Mach numbers, namely M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient and Mach number as well as the altitudes. The critical speed and frequency for each Mach number are given in Table 5.3. The results presented in Fig 5.15 shows that:

- ZTAIC predicts non-explosive damping of the unstable modes for all altitudes.
- In the post-flutter region, it is very likely that the nonlinearity-induced stable damping (from either the structures or aerodynamics, if any) can nullify the unstable damping and stop the growth of the amplitude, leading to LCO.
- Similar to the classical flutter case, the on-set of LCO is very sensitive to the linear structural damping level.

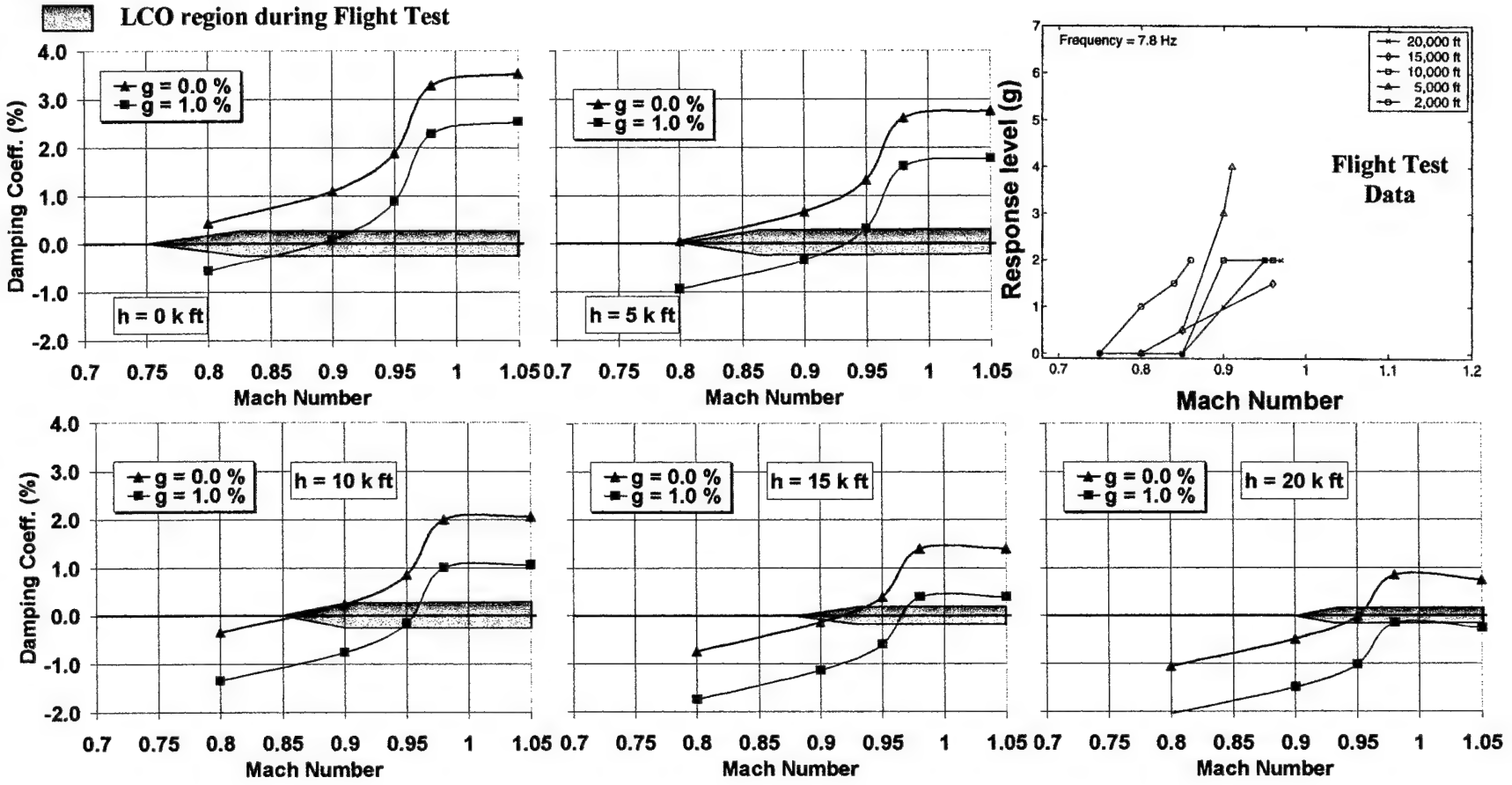


Figure 5.14 The Correlation between the Flutter Prediction using the Nonlinear Aerodynamic Approach (ZTAIC) and the Flight Test Data.

Table 5.3 Critical speed and Frequency Using the Nonlinear Aerodynamic Approach (ZTAIC).

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	480	7.97
	1.0	606	7.95
0.90	0.0	468	7.97
	1.0	588	7.93
0.95	0.0	409	7.99
	1.0	525	7.95
0.98	0.0	372	8.00
	1.0	455	7.98
1.05	0.0	422	7.94
	1.0	494	7.92

SECTION 6

CORRELATION OF THE F-16 / STORE NON-TYPICAL LCO PREDICTIONS WITH FLIGHT TEST DATA

6.1 Flight Test Result and Previous Numerical Prediction

Reference 1 described that a non-typical LCO response occurred during the flight test of F-16 with the store configurations shown in Table 3.1. The instability response was characterized by a gradual onset of sustained limited amplitude wing oscillations where the oscillation amplitude does not progressively increase with increasing Mach number (Ref 1). The oscillation may be present only in a limited portion of the flight envelope. The measured oscillatory wing tip response during level flight at five altitude is shown in Figure 3.3. The response behavior of this configuration was only sensitive in 0.88 – 0.94 Mach range. The instability response was antisymmetric at a frequency of 8.2 Hz for all altitudes.

An attempt to predict this non-typical LCO case has been conducted by Denegri in Refs 1 and 18. The calculation was performed at M = 0.90. The aerodynamic model used in Refs 1 and 18 is an isolated wing with tip launcher only, *i.e.* the same as the aerodynamic model # 1 of the present work as shown in Fig 6.1. No aerodynamic modeling of fuselage, empenage and underwing stores is included. The only influence of the fuselage, empenage and stores considered in the flutter analysis is their effect on structural modal characteristics. The flutter calculation was conducted using the non-matched point method. The critical speed and frequency are V_f = 393 KCAS and f_f = 8.26 Hz for the structural damping g = 0%. The result indicates that the flight test frequency is well correlated with the critical mode frequency. However, the calculated critical speed was higher than the flight test data as shown in Table 4.1

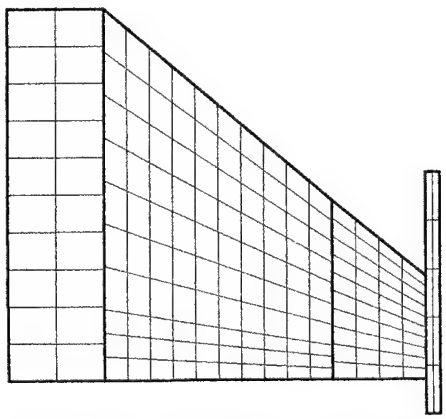


Figure 6.1 Aerodynamic Model # 1 for the Nontypical LCO case

6.2 Linear Aerodynamic Approach

6.2.1 Aerodynamic Model # 1

The first aerodynamic model of the present work is the isolated wing with tip launcher (Figure 6.1), *i.e* the same as the model used in Ref 17. Figures 6.2 show the first four natural (undamped) mode shapes. Employing a non-matched point flutter analysis of ZAERO at M= 0.90 and sea level density, the critical speed was found to be V_f = 403 KCAS and flutter frequency was f_f = 8.24 Hz for the structural damping g = 0%. For the structural damping g = 1%, the critical speed and frequency are V_f = 602 KCAS and f_f = 8.21 respectively. These results are very close to the analysis results in Refs 1 and 18 as shown in Table 6.1 and Fig 6.3. Figure 6.4 shows the flutter mode shape at several time steps. The V-g and V-f plots of the present flutter analysis given in Fig 6.4 show similar results to Fig 12 of Ref 17.

Table 6.1 Flutter Results Using Linear Aerodynamics at M = 0.9.

Aerodynamic Model or Methods		Flutter Speed (KCAS)	Flutter Frequency (Hz)
Flight test (on set of flutter speed)		560	8.2
Denegri's DLM results (Aerodynamic Model # 1: Wing + tip launcher only, non matched point, g = 0%)		393	8.26
Aerodynamic Model # 1: Wing + tip launcher only, (non matched point)	g = 0%	403	8.24
	g = 1%	602	8.21
Aerodynamic Model # 2: Whole aircraft without underwing stores (matched point)	g = 0%	508	8.22
	g = 1%	678	8.18
Aerodynamic Model # 3: Whole aircraft with stores (matched point)	g = 0%	471	8.18
	g = 1%	690	8.08
Aerodynamic Model # 3: Whole aircraft with stores but without rigid body modes (matched point)	g = 0%	642	8.13
	g = 1%	796	8.03

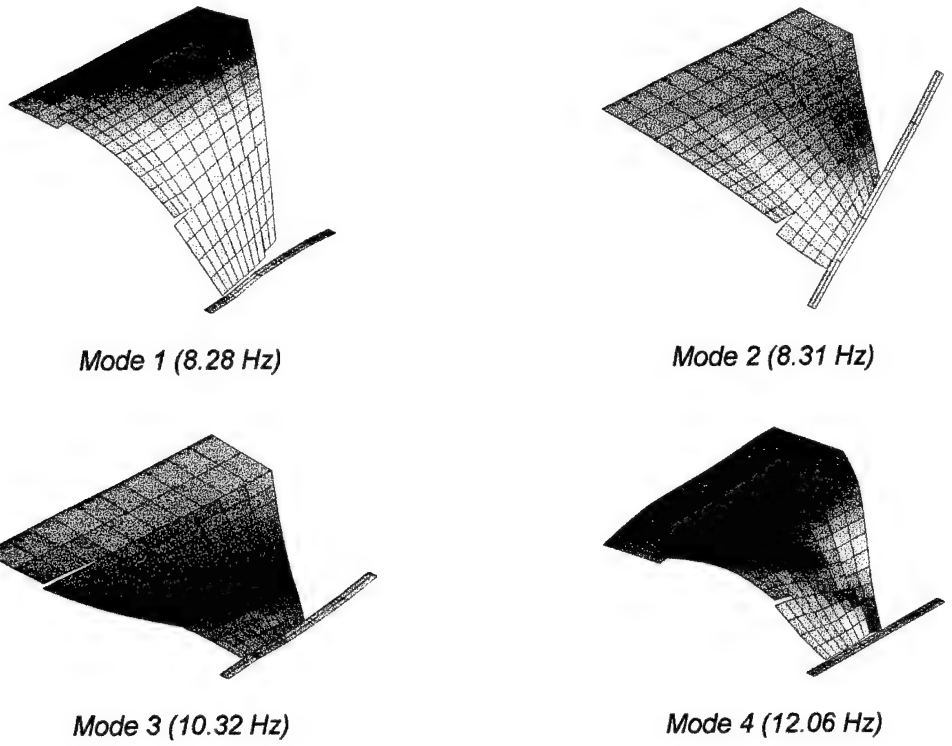


Figure 6.2 Vibration Modes of Aerodynamic Model # 1.

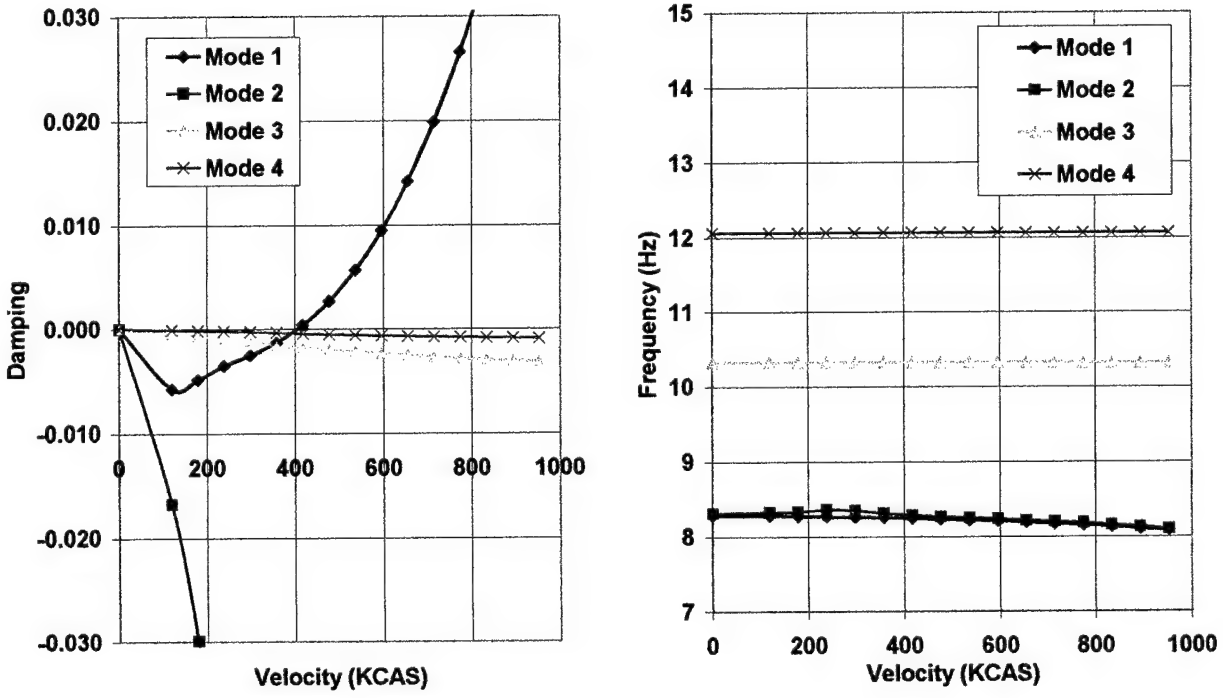


Figure 6.3 The Flutter V-g and V-f plots for Wing-tip Launcher Only Model at M = 0.9 Using the Linear Aerodynamic Approach.

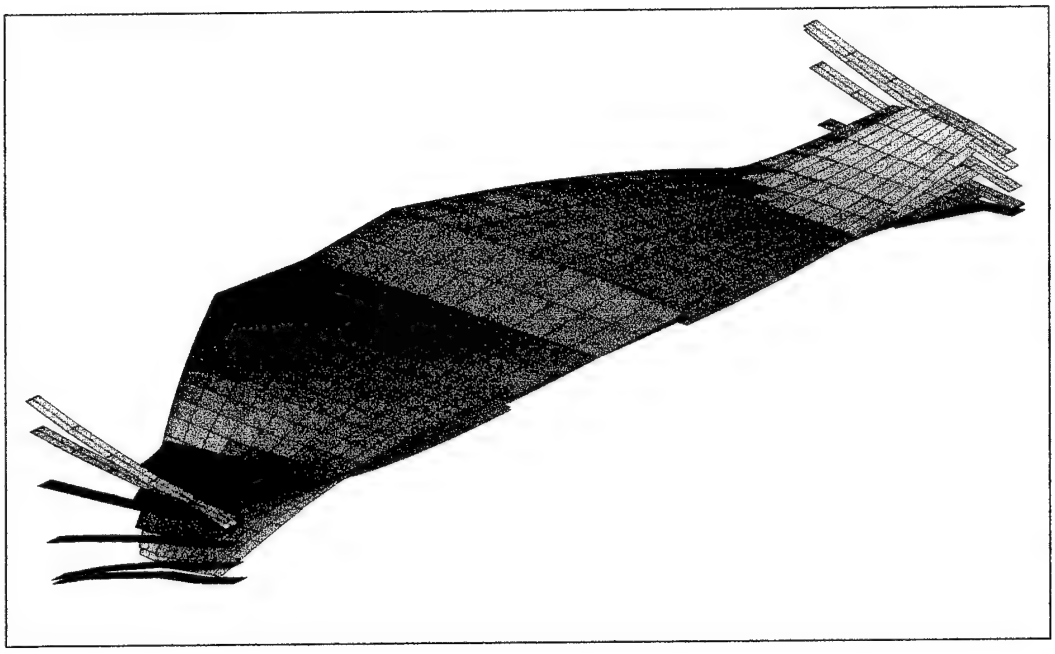
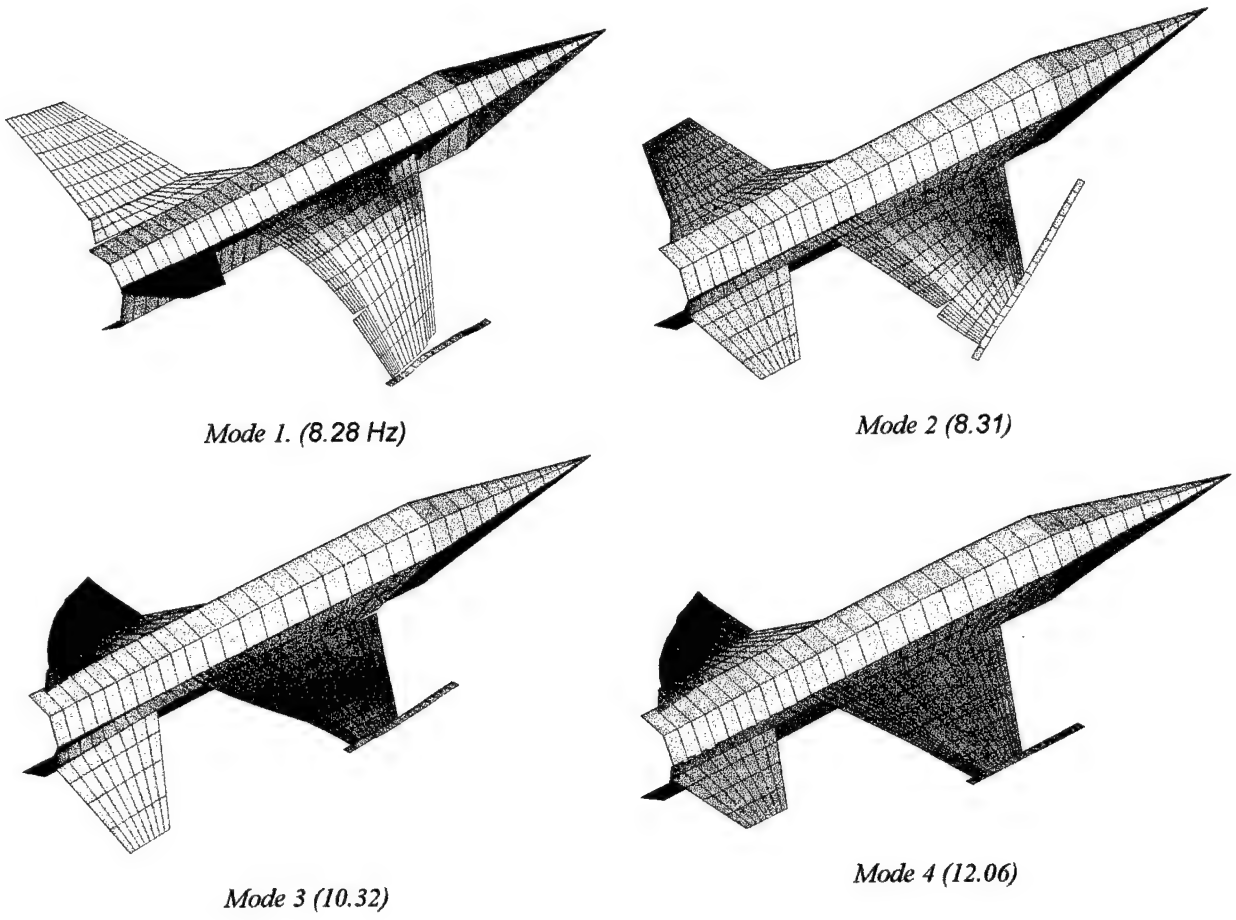


Figure 6.4 The Flutter Mode Shape of the Wing-Tip Launcher Only Model.

6.2.2 Aerodynamic Model # 2

The flutter calculation was repeated using the aerodynamic model # 2, i.e. the whole aircraft without underwing stores. The flutter calculation using the matched point method gave the flutter speed/frequency at V_f = 508 KCAS / f_f = 8.22 Hz. If the structural damping is assumed to be g = 1.0%, than the flutter speed and frequency becomes V_f = 678 KCAS and f_f = 8.18 Hz. The result for this configuration shows that the inclusion of the fuselage and empenage aerodynamic model improves the result, i.e. closer to the flight test data.



Mode 1. (8.28 Hz)

Mode 2 (8.31)

Mode 3 (10.32)

Mode 4 (12.06)

Figure 6.5 Vibration Modes of the Aircraft Model without Underwing Stores.

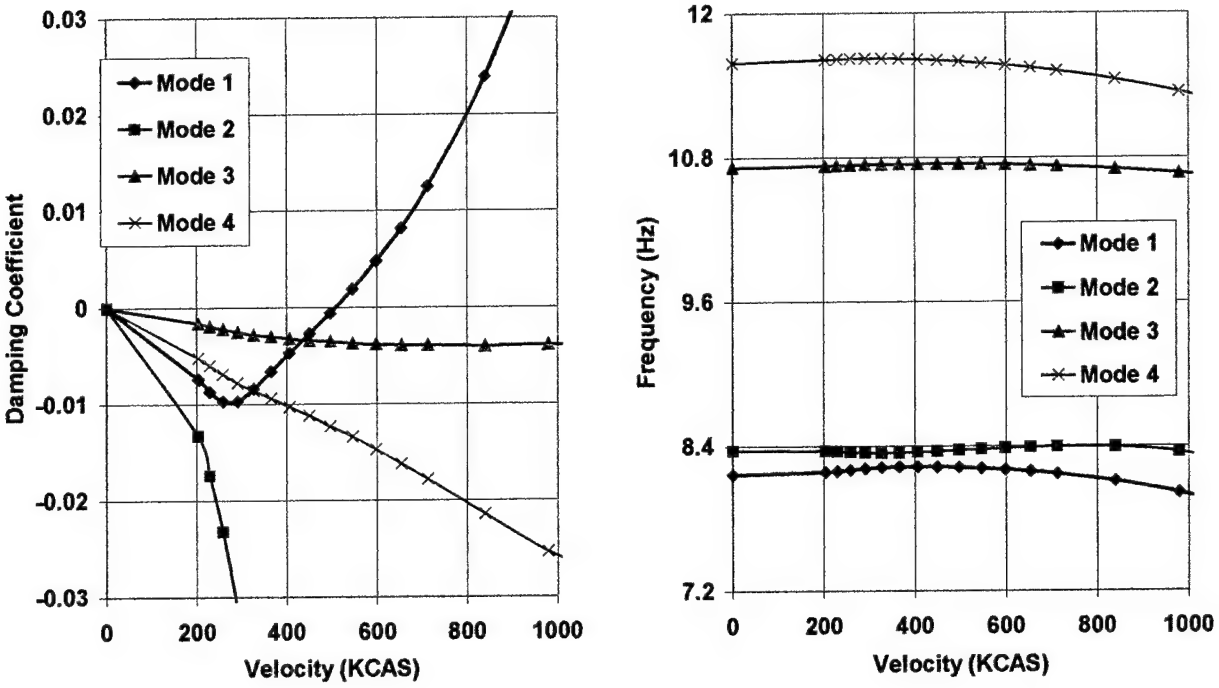


Figure 6.6 The Flutter V-g and V-f Plots for the Whole Aircraft Model without Underwing Stores at M = 0.9 Using The Linear Aerodynamic Approach.

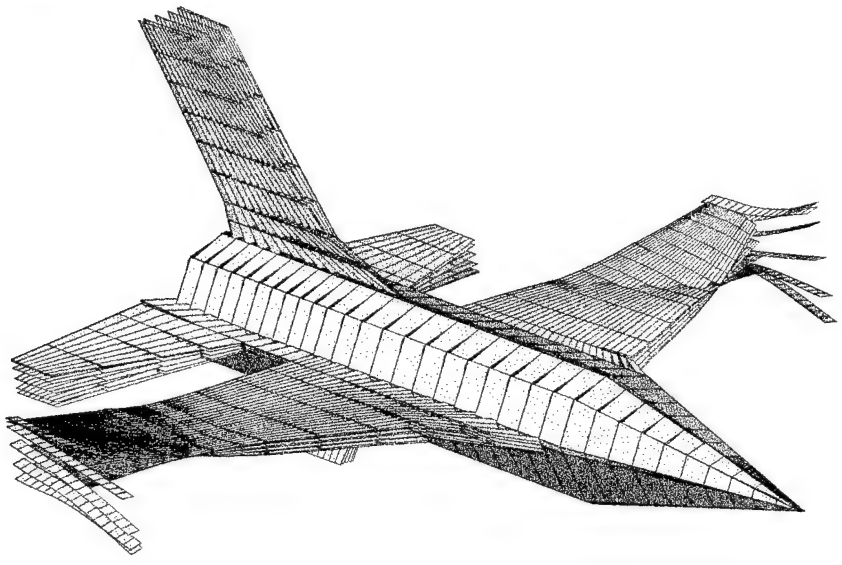


Figure 6.7 The Flutter Mode Shape of the Aircraft Model without Underwing Stores

6.2.3 Aerodynamic Model # 3 at M = 0.90

The flutter calculation was repeated using the aerodynamic model # 3, i.e. the whole aircraft with underwing stores. The natural mode shapes are shown in Figure 6.8. The flutter calculation

using the matched point method gave the flutter speed/frequency at V_f = 642 KCAS / f_f = 8.13 Hz. Note that there is no second critical speed in this third model. If the structural damping is assumed to be g = 1.0% than the flutter speed and frequency becomes V_f = 796 KCAS and f_f = 8.03 Hz. Clearly, the result for this configuration is closer to the flight test data as shown in Table 6.1.

All of the previous calculations on the non-typical LCO did not include the structural rigid body modes. If the anti-symmetric rigid body modes are included to the whole aircraft with store model, the similar procedures gave the flutter speed / frequency at V_f = 471 KCAS / f_f = 8.18 Hz for g=0%, and V_f = 690 KCAS / f_f = 8.08 Hz for g = 1.0%. These results are very close to the results of the model without rigid body modes. Therefore, for the classical flutter of the present case, the influence of the rigid body modes is not significant. Figure 6.9 shows the flutter V-g and V-f diagram for the aerodynamic model # 3. The flutter modes for several time steps is presented in Fig 6.10.

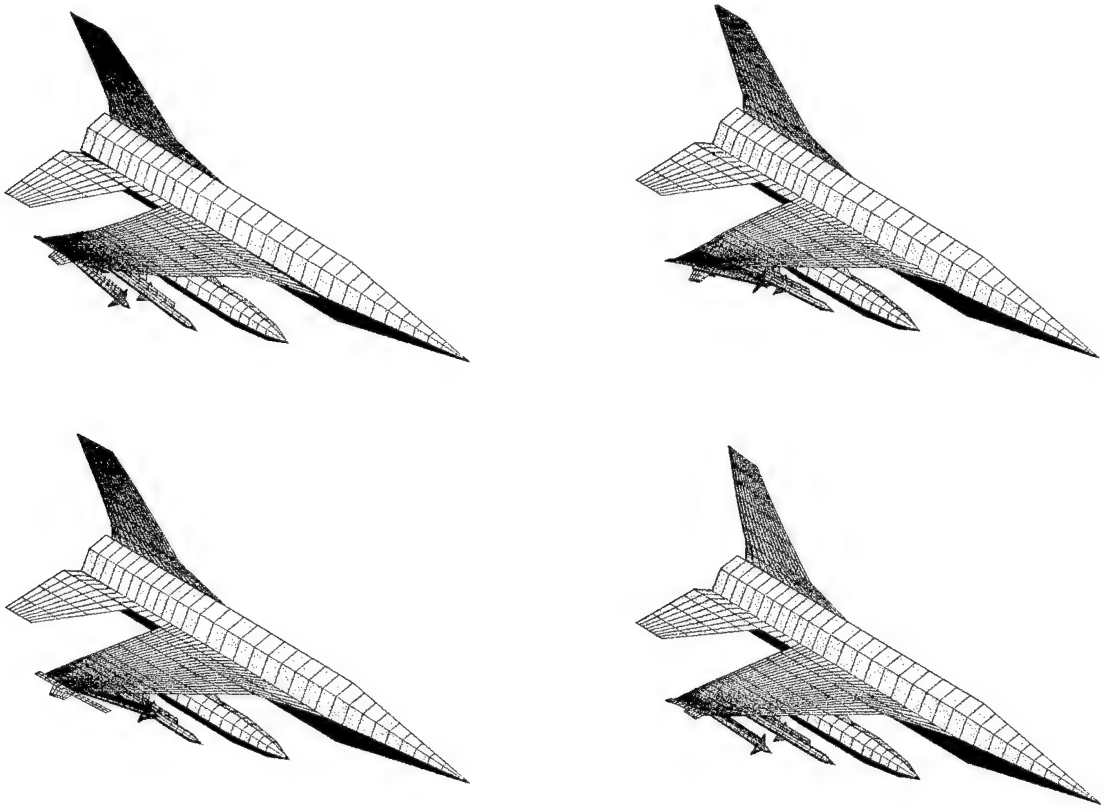


Figure 6.8 Vibration Modes of the Aircraft Model with Underwing Stores.

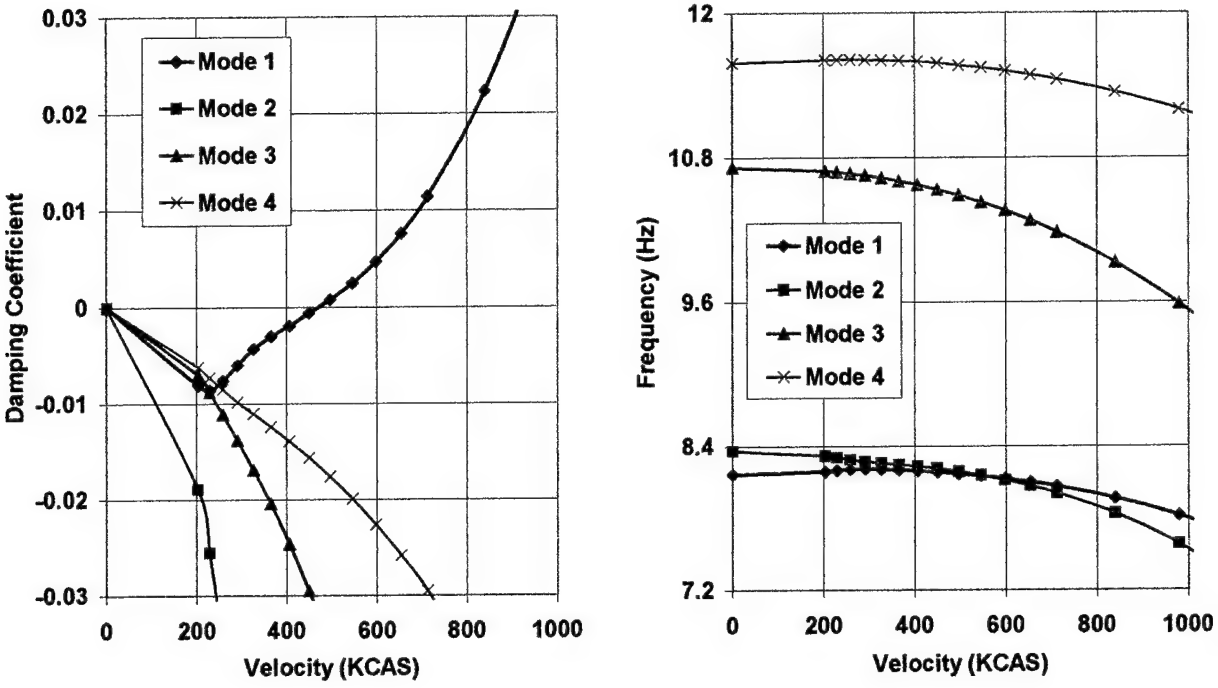


Figure 6.9 The Flutter V-g and V-f plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using the Linear Aerodynamic Approach.

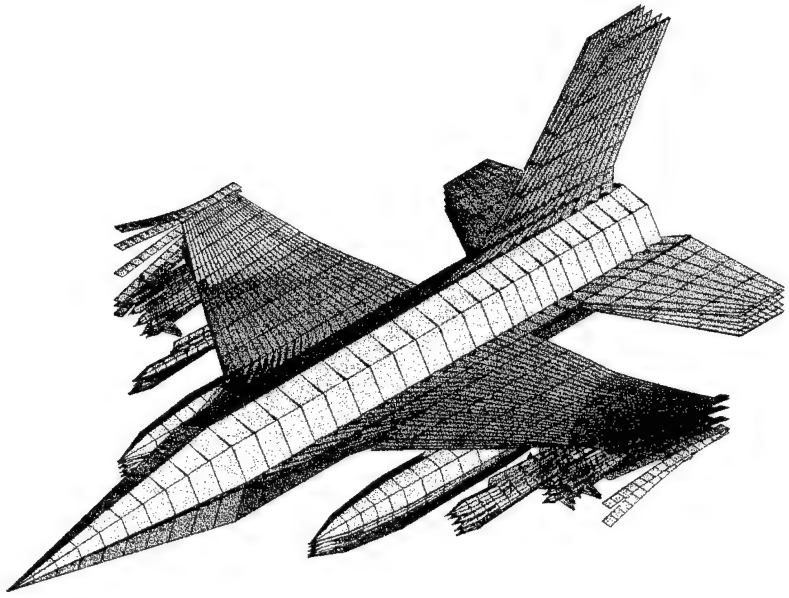


Figure 6.10 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores at M = 0.9.

6.2.4 Aerodynamic Model # 3 at Mach 0.8 – 1.05

The flutter calculations for M = 0.90 showed improvement on the solution results if a more refined aerodynamic model is used. However, previous results does not give a direct correlation between the flutter prediction and the flight test data. Note that, to indicate the flutter onset, the flight test data presents the measure acceleration response level in terms of Mach numbers and altitudes. Therefore, in order to correlate the numerical predictions with the flight test data, the calculation was repeated for several Mach numbers, namely M = 0.80, 0.90, 0.95, 0.98, and 1.05. The flutter solution is represented by the damping coefficient as a function of Mach number for each altitude. The critical speed and frequency for each Mach number are given in Table 6.2. The results presented in Fig 6.11. shows that

- Linear aerodynamic approach (ZONA6/ZONA7) predicts non-explosive damping of the unstable mode in all altitudes.
- For the altitude lower than 15,000 ft, the flutter onset Mach number of the flight test data was correlated very well with the linear aerodynamic approach if the structural damping is assumed to be 1%.
- For the altitude of 15,000 ft and higher, the onset Mach number of the flight test data was occurred near M = 0.98 and 1.02 where the nonlinearity effect of the transonic aerodynamic is significant. Therefore, the linear aerodynamic approach gives a higher prediction of the onset Mach number for these altitudes.

Table 6.2 Critical Speed and Frequency Using ZONA6/ZONA7 (Linear Aerodynamic Approach).

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	576	8.15
	1.0	778	8.03
0.90	0.0	571	8.17
	1.0	615	8.08
0.95	0.0	451	8.17
	1.0	656	8.08
0.98	0.0	474	8.17
	1.0	660	8.08
1.05	0.0	376	8.20
	1.0	573	8.11

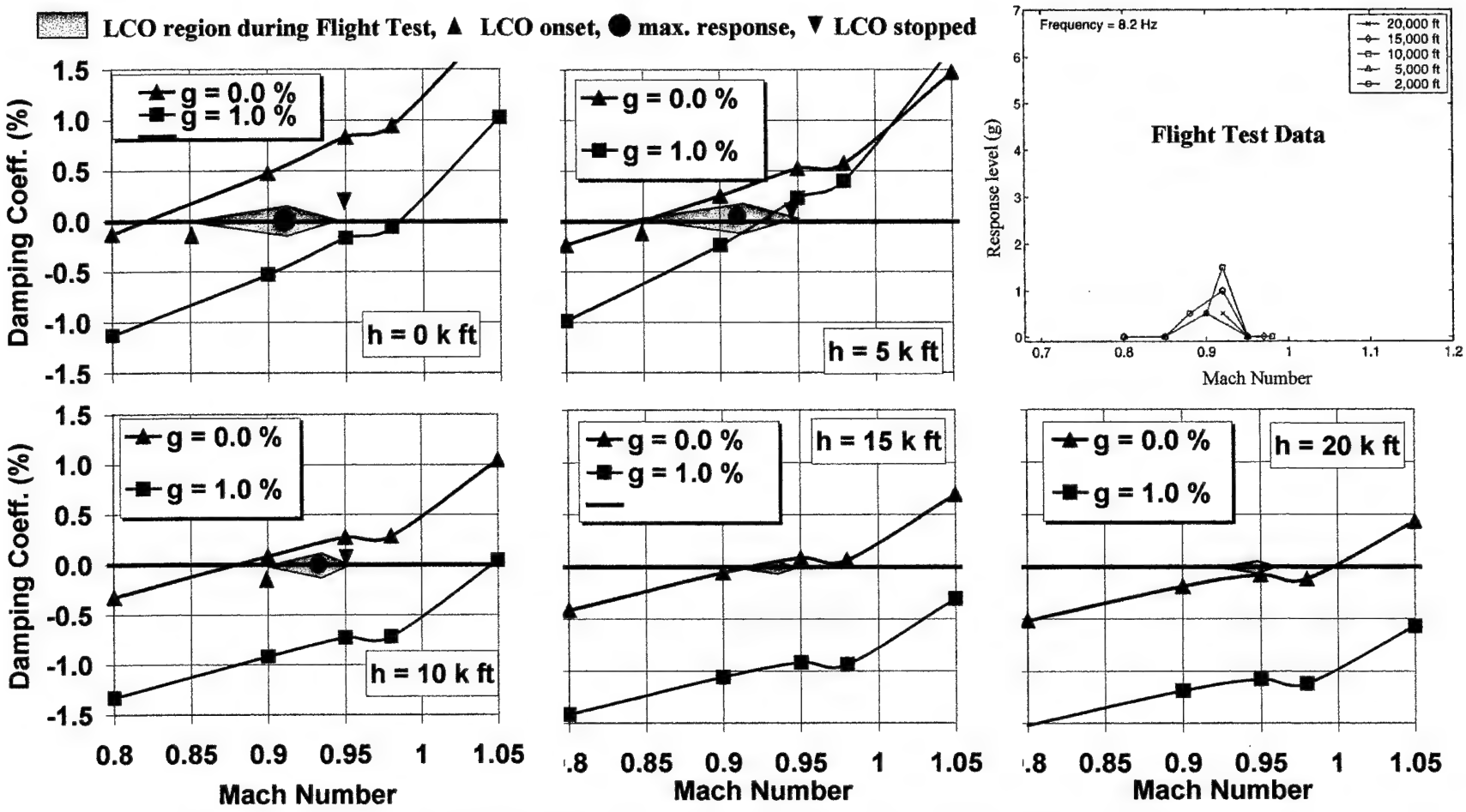


Figure 6.11 Correlation between the Flutter Prediction using the Linear Aerodynamic Approach (ZONA6/ZONA7) with Flight Test Data of the Classical Flutter Case.

6.3 Nonlinear Aerodynamic Approach

The flight test for the non-typical LCO configuration indicated that the aeroelastic instability for this case occurred between 0.85 and 1.1, *i.e.* in transonic regime where the nonlinear behavior of the aerodynamic flow may significantly influence the critical speed. To investigate the flutter calculation in this transonic regime, a nonlinear aerodynamic approach based on the ZTAIC method was used for the prediction of the unsteady aerodynamic data. The steady aerodynamic data was provided by Ref 20 as shown in section 3. Flutter calculation was conducted to the whole aircraft with stores for Mach numbers ranging between 0.80 and 1.05. The rigid body modes were included in the structural dynamic calculations.

6.3.1 Aerodynamic Model # 3 at M = 0.90

The flutter calculation for M = 0.90 using the matched point method gave the flutter speed/frequency at V_f = 630 KCAS / f_f = 8.16 Hz. If the structural damping is assumed to be g = 1.0%, the flutter speed and frequency becomes V_f = 595 KCAS and f_f = 8.18 Hz. Compared to the results based on the linear aerodynamic approach given in Table 6.1, the present result using the nonlinear aerodynamic approach is closer to the flight test data. Figure 6.12 shows the V-g and V-f plot for Mach 0.90. The associated flutter mode is presented in Fig 6.13.

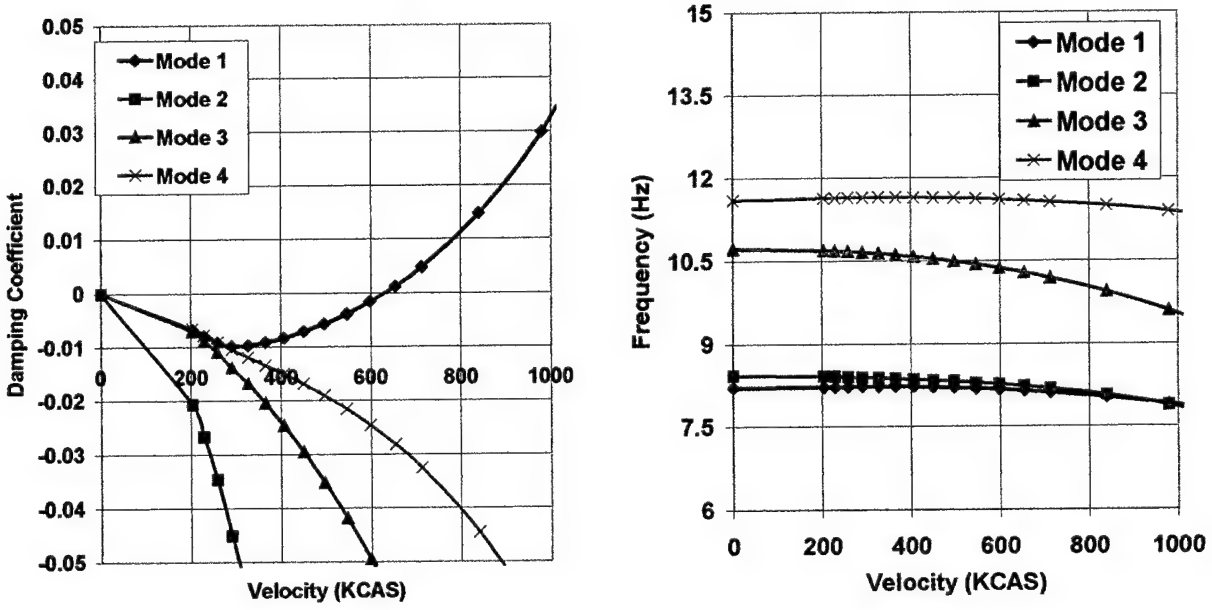


Figure 6.12 The Flutter V-g and V-f Plots of the Whole Aircraft Model with Underwing Stores at M = 0.9 Using the Nonlinear Aerodynamic Approach.

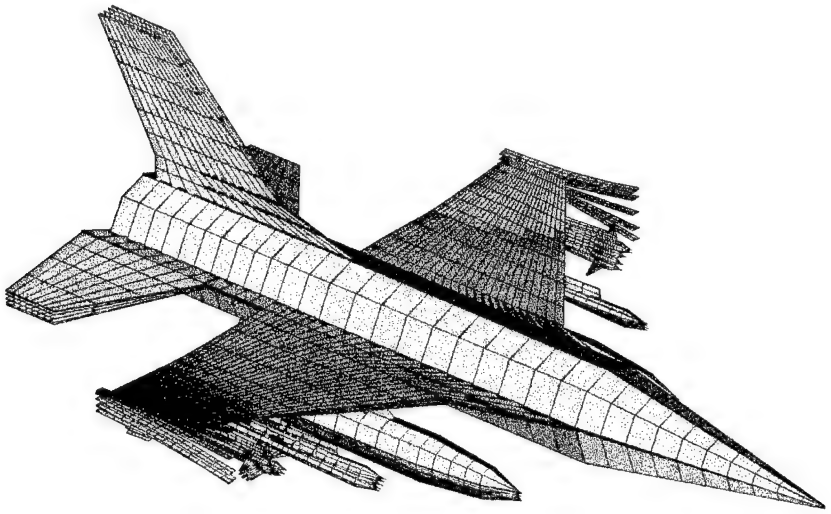


Figure 6.13 The Flutter Mode Shape of the Whole Aircraft Model with Underwing Stores at M = 0.9 Calculated Using the Non Linear Aerodynamic Method.

6.3.2 Aerodynamic Model # 3 at M = 0.80 – 1.05

In order to correlate the numerical predictions with the flight test data, the calculation for the nonlinear aerodynamic approach was repeated for several Mach numbers, namely M = 0.80, 0.90, 0.95, 0.98, and 1.05. The rigid body modes were included in the calculations. Figure 6.14 shows the flutter solution represented by the damping coefficient as a function of Mach number for several altitudes. Table 6.3 shows the critical speed and frequency for each Mach number. The results presented in Fig 6.14. indicate that:

- ZTAIC, i.e. the nonlinear aerodynamic approach, predicts the hump flutter modes in all altitudes, i.e. the aeroelastic system is unstable before M = 0.95, but becomes stable between M=0.95 and M=1.0.
- Similar to the classical flutter and the typical LCO cases, the on-set of LCO is very sensitive to the linear structural damping level. But, because of the sudden increase of the stable damping at M=0.98, the condition where LCO disappears is relatively insensitive to the structural damping.
- The above shows that indeed ZTAIC can provide correct trend for predicting the non-typical LCO case.

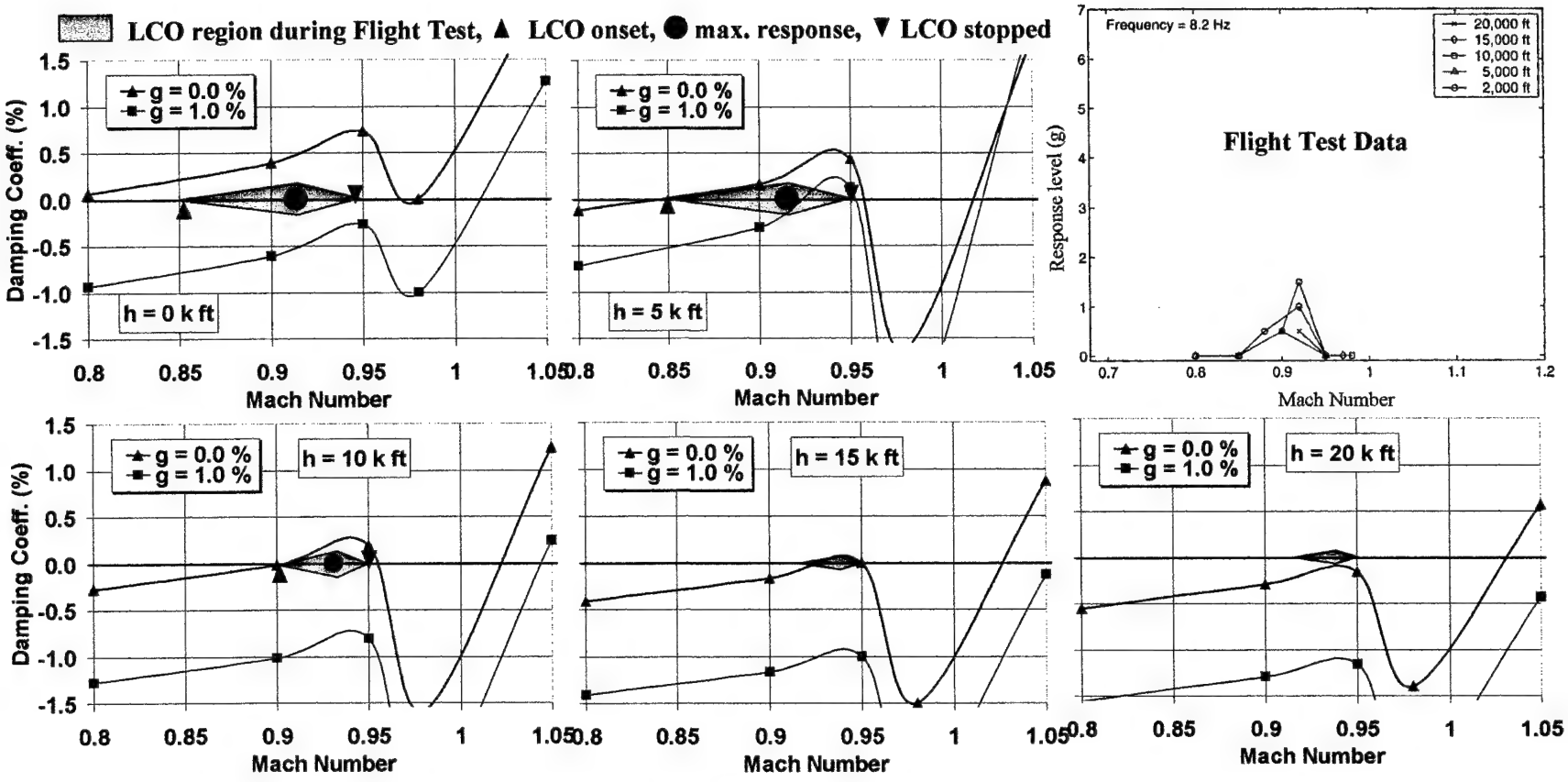


Figure 6.14 The Correlation between the Flutter Prediction using the Nonlinear Aerodynamic Approach (ZTAIC) and the Flight Test Data.

Table 6.3 Critical speed and Frequency Using ZTAIC (Nonlinear Aerodynamic Approach).

Mach Number	*Damping Coeff. g (%)*	*Flutter Speed (KCAS)*	*Flutter Frequency (Hz)*
0.80	0.0	616	8.19
	1.0	752	8.12
0.90	0.0	630	8.16
	1.0	595	8.18
0.95	0.0	475	8.18
	1.0	672	8.09
0.98	0.0	1127	8.00
	1.0	1195	8.00
1.05	0.0	365	8.21
	1.0	543	8.16

SECTION 7

CONCLUSIONS AND FUTURE WORK

We have successfully investigated the accuracy of the ZAERO aeroelastic software system to predict various types of flutter and limit cycle oscillations (LCO) and developed a massive store management (MSM) system as a platform for a rapid assessment of flutter/LCO (RAFEL) software system for massive aircraft/store configurations.

To test the capability of ZAERO, a number of aircraft/store configurations with various structure and aerodynamic modeling are used in subsonic, transonic and supersonic flight regimes using linear and nonlinear unsteady aerodynamic procedures of ZAERO. Three different F-16 with store configurations were used to identify various categories of aeroelastic instability responses including classical flutter, typical LCO and non-typical LCO. According to Reference 1, these categories are representative of the wide variety of aeroelastic responses encountered by fighter aircraft with external stores.

To accurately predict the flutter/LCO onset speed and frequency at various flight altitudes, the matched point option of the g-method, a robust aeroelastic solver of ZAERO, was used. The procedure is important to correlate directly the flutter/LCO prediction in terms of flight altitude and Mach number with the flight test data.

The influence of structural rigid body modes on aeroelastic instability was investigated. The result shows that the influence is small for classical flutter and typical LCO cases, but can be significant for the non-typical LCO case. The inclusion of the structural rigid body modes in the aeroelastic analysis adds very small fraction of computational time but increase the accuracy of the result. Therefore, it is recommended to include the rigid body modes in the flutter/LCO prediction.

The influence of linear and nonlinear unsteady aerodynamic methods to discern differences between classical flutter, typical LCO and non-typical LCO was investigated. By using ZONA6/ZONA7 of ZAERO for a linear aerodynamic approach, the classical flutter case has been successfully identified. By using ZTAIC of ZAERO for a nonlinear aerodynamic approach, the differences between typical and non-typical LCO cases as well as classical flutter case have been successfully predicted including the oscillation frequency and onset velocity of the instability response.

The influence of various aerodynamic modeling of stores and whole aircraft, including fuselage, wing and horizontal/vertical tails, was investigated. The simplest aerodynamic model, i.e. the wing with tip launcher only, is capable to identify the oscillation frequency of flutter/LCO, but fails to predict the onset velocity. The use of more refined aerodynamic model including the whole aircraft and stores successfully improves the prediction and provides a well correlation with the flight test data. Therefore, the store aerodynamic modeling is important for accurate prediction of the flutter/LCO.

To anticipate the increase of computational time due to the additional aerodynamic model of massive aircraft/store configurations, a rapid aeroelastic computational scheme was designed using ZAERO as the basic software system. The rapid computational scheme is based on the strategy to re-use the aerodynamic influence coefficient (AIC) data, which is the most time consuming part in aeroelastic computation, and based on an efficient massive data management system to rapidly store and recall the AIC data. A scheme to utilize various parts of ZAERO, including ZONA6, ZONA7, ZTAIC, the g-method package and spline modules, has been designed to substantially increase the computational efficiency of ZAERO for the massive aircraft/store flutter/LCO assessment.

The achievement of the Phase I objectives has paved the way and has provided considerable technical insight for future implementation of the RAFEL software system in aircraft/store flutter clearance. Consequently, it leads to a well-conceived plan for a Phase II development. The proposed tasks to be conducted in Phase II include:

Implementation of the proposed RAFEL software system:

- Develop an off-line software to generate invariant AIC matrices of aircraft and stores, set up corresponding finite element models and spline input, and save the data on a permanent data base.
- Develop an online software that is driven by the GUI (Graphical User Interface) pre-processor to generate the input files of ZAERO and NASTRAN by retrieving the permanent database and can launch NASTRAN and ZAERO jobs.
- Develop an online software that is driven by the GUI post-processor to rapidly search for the critical flutter/LCO configurations and display the results.

Implementation of GUI system as the underlying software to

- Graphically display all available stores whose data have been saved in the data base.
- Allow users to graphically select arbitrary store configurations.
- Retrieve store data from the permanent database, assemble NASTRAN and ZAERO input files and launch NASTRAN and ZAERO input files.
- Process the ZAERO results of all aircraft/store configurations to search for the critical flutter/LCO cases and graphically display the results.

Implementation of parallel computing environment to accelerate computation

- A parallel virtual machine (PVM) software system can establish a network system linking all computers/CPU's.
- The PVM system allows an optimum distribution of jobs on each CPU to accelerate the computation.
- No user interaction is required since the parallel computing environment is fully automated system.

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Appendix A.
Structural Finite Element Data for Classical Flutter Case

```
ID LMTAS BLOCK 40 F-16 FLUTTER FEM
SOL 103
TIME 20
$
CEND
$
TITLE=F-16 1/2 AIRPLANE FINITE ELEMENT MODEL FOR FLUTTER ANALYSIS
SUBTI=ANTI-SYMMETRIC CENTERLINE BOUNDARY CONDITIONS //
LABEL=CONFIG 5 = MA41
DISP=ALL
ECHO=SORT
$ DMIG VERTICAL TAIL STIFFNESS MATRIX
K2GG=VTAIL
$ EIGENVALUE EXTRACTION
METHOD=1
$ SYMMETRIC B.C. / SPC=2 FOR ANTISYMMETRIC
SPC=2
$
$ SET 203022=GRIDS USED IN FLUTTER ANALYSIS.
$ ADD GRIDS 801 THROUGH 814 FOR DYNAMIC RESPONSE.
$
SET 203022=   2,   3,   4,   5,   6,
              9,  11,  13,  15,  17,
             19,  20,  21,  26,  29,
             33,  39,  44,  47,  51,
             52,  53,  56,  60,  61,
             62,  64,  65,  68,  72,
             73,  74,  75,  77,  78,
             81,  85,  86,  87,  89,
             90,  91,  92,  93,  95,
            102, 103, 104, 105, 106,
            107, 108, 109, 110, 111,
            112, 113, 122, 123, 124,
            128, 129, 130, 131, 132,
            133,3004,3006,3009       $ AIM-9/16S200 OR 16S200 ON TIP
$
OUTPUT(PLOT)
CSCALE=1.8
PAPER SIZE=26. BY 20.
$
$ SET 10=ELEMENTS USED IN MODE PLOTS
$
$ FUSELAGE CENTERLINE
SET 10=   1 THRU   26,
$ WING BOX
       1001 THRU 1005,
       1007,1010 THRU 1013,
       1020,1023 THRU 1025,
       1031,1034,1036,1043,1045,
       1046,1048 THRU 1054,
       1056 THRU 1062,
       1071 THRU 1074,
       1078,1079,1080,
       1086 THRU 1090,
       1099,1100,1101,
       1075,1076,1077,
       1081 THRU 1085,
       1091 THRU 1097,
       1102 THRU 1111,
       1116 THRU 1125,
       1126,1127,1128,
$ LEADING EDGE FLAP / 1258 ACTUATOR
       1131 THRU 1134,
       1136,1137,1138,
       1140,1141,1142,
       1144,1145,1146,
       1148 THRU 1151,
       1152 THRU 1171,
$ FLAPERON
       1181 THRU 1185,
       1187 THRU 1189,
       1190 THRU 1194,
       1196 THRU 1203,
       1205 THRU 1207,
       1209 THRU 1220,
       1231 THRU 1238,
       1251 THRU 1258,
       1261 THRU 1268,
$ HORIZONTAL TAIL
       2001 THRU 2058,
$ VERTICAL TAIL
       2401 THRU 2460,
$ 16S200 // STATION 1,9
       3003 THRU 3009,
$ AIM-9L // STATION 1,9
       3014,3015
$
MAXIMUM DEFORMATION 35.
AXES MX,MY,Z
VIEW 60.0,30.,0.
FIND SCALE ORIGIN 10 SET 10
PLOT MODAL DEFO 0 SET 10 ORIGIN 10
$
$
BEGIN BULK
ASET    3500    123456
ASET    3501    123456
ASET1   1       163     153     154     155     156     71      286
ASET1   1       267
ASET1   1       284     281
ASET1   1       367     408     368     359     384
ASET1   1       373     364     381     383
ASET1   1       386     391     371     362     387     392     393
ASET1   1       389     369     360     385     390     370     361
ASET1   1       410
ASET1   3       6       17      5       15      4       13      3
ASET1   3       11      2       9
ASET1   3       19      72      20      60      73      21      61
ASET1   3       39      47      56      68      81
ASET1   3       74      51      62      75      26      52      64
ASET1   3       77      29      44      53      65      78      33
ASET1   3       85      86      87      88
ASET1   3       90      103     109     89      102     108
ASET1   3       95      107     113     93      106     112     124
ASET1   3       130     133     92      105     111     123     129
ASET1   3       132     91      104     110     122     128     131
ASET1   3       233
ASET1   3       251     THRU    266
ASET1   3       3017    3019    3022
ASET1   5       153     154     155     156     71      286     284
ASET1   5       410
ASET1   5       459
ASET1   6       437     281     410
ASET1   6       458
ASET1   3456    3018
CBAR    27      27      284     410     1.      1.      0.
CBAR    2401    2401    407     367     0.      1.      1.
CBAR    2402    2402    367     368     0.      1.      1.
CBAR    2403    2403    368     369     0.      1.      1.
CBAR    2404    2404    369     370     0.      1.      1.
CBAR    2405    2405    370     371     0.      1.      1.
CBAR    2406    2406    371     372     0.      1.      1.
CBAR    2407    2407    372     373     0.      1.      1.
CBAR    2408    2408    357     358     0.      1.      1.
CBAR    2409    2409    358     359     0.      1.      1.
CBAR    2410    2410    359     360     0.      1.      1.
CBAR    2411    2411    360     361     0.      1.      1.
CBAR    2412    2412    361     362     0.      1.      1.
CBAR    2413    2413    362     363     0.      1.      1.
CBAR    2414    2414    363     364     0.      1.      1.
CBAR    2415    2415    409     375     0.      1.      1.
CBAR    2416    2416    375     376     0.      1.      1.
CBAR    2417    2417    376     377     0.      1.      1.
CBAR    2418    2418    377     378     0.      1.      1.
CBAR    2419    2419    378     379     0.      1.      1.
CBAR    2420    2420    379     380     0.      1.      1.
CBAR    2421    2421    380     381     0.      1.      1.
CBAR    2422    2422    382     383     0.      1.      1.
CBAR    2423    2423    384     385     0.      1.      1.
CBAR    2424    2424    385     386     0.      1.      1.
CBAR    2425    2425    386     387     0.      1.      1.
CBAR    2426    2426    387     388     0.      1.      1.
CBAR    2427    2427    389     390     0.      1.      1.
CBAR    2428    2428    390     391     0.      1.      1.
CBAR    2429    2429    391     392     0.      1.      1.
CBAR    2430    2430    392     393     0.      1.      1.
CBAR    2431    2431    407     357     0.      1.      1.
CBAR    2432    2432    357     409     0.      1.      1.
CBAR    2433    2433    367     358     0.      1.      1.
CBAR    2434    2434    358     375     0.      1.      1.
CBAR    2435    2435    375     384     0.      1.      1.
CBAR    2436    2436    375     406     0.      1.      1.
CBAR    2437    2437    406     408     0.      1.      1.
CBAR    2438    2438    368     359     0.      1.      1.
CBAR    2439    2439    359     376     0.      1.      1.
CBAR    2440    2440    376     384     0.      1.      1.
CBAR    2441    2441    369     360     0.      1.      1.
CBAR    2442    2442    360     377     0.      1.      1.
CBAR    2443    2443    377     385     0.      1.      1.
CBAR    2444    2444    370     361     0.      1.      1.
CBAR    2445    2445    361     378     0.      1.      1.
CBAR    2446    2446    378     386     0.      1.      1.
CBAR    2447    2447    371     362     0.      1.      1.
CBAR    2448    2448    362     379     0.      1.      1.
CBAR    2449    2449    372     363     0.      1.      1.
CBAR    2450    2450    363     380     0.      1.      1.
CBAR    2451    2451    380     382     0.      1.      1.
CBAR    2452    2452    380     388     0.      1.      1.
CBAR    2453    2453    373     364     0.      1.      1.
CBAR    2454    2454    364     381     0.      1.      1.
CBAR    2455    2455    381     383     0.      1.      1.
CBAR    2456    2456    384     389     0.      1.      1.
CBAR    2457    2457    385     390     0.      1.      1.
CBAR    2458    2458    386     391     0.      1.      1.
CBAR    2459    2459    387     392     0.      1.      1.
CBAR    2460    2460    388     393     0.      1.      1.
CBAR    3502    3502    3500    52      1.      1.      0.
CBAR    3503    3502    3501    52      1.      1.      0.
CBEAM   1       1       163     164     1.      0.      0.
CBEAM   2       2       164     153     1.      0.      0.
CBEAM   3       3       267     154     1.      0.      0.
CBEAM   4       4       154     155     1.      0.      0.
CBEAM   5       5       155     156     1.      0.      0.
CBEAM   6       6       268     36      1.      0.      0.
CBEAM   7       7       36      42      1.      0.      0.
CBEAM   8       8       42      50      1.      0.      0.
CBEAM   9       9       50      437     1.      0.      0.
CBEAM   10      10      437     59      1.      0.      0.
CBEAM   11      11      59      431     1.      0.      0.
CBEAM   12      12      431     71      1.      0.      0.
CBEAM   13      13      71      84      1.      0.      0.
CBEAM   14      14      84      298     1.      0.      0.
CBEAM   15      15      298     286     1.      0.      0.
CBEAM   16      16      286     117     1.      0.      0.
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CBEAM   17      17      117     285     1.      1.      0.
CBEAM   18      18      285     283     1.      1.      0.
CBEAM   19      19      283     284     1.      1.      0.
CBEAM   20      20      284     282     1.      1.      0.
CBEAM   21      21      282     281     1.      1.      0.
CBEAM   22      22      281     405     1.      0.      0.
CBEAM   31      31      36      35      1.      1.      0.
CBEAM   32      32      42      41      1.      1.      0.
CBEAM   33      33      50      49      1.      1.      0.
CBEAM   34      34      59      58      1.      1.      0.
CBEAM   35      35      71      70      1.      1.      0.
CBEAM   36      36      84      83      1.      1.      0.
CBEAM   37      37      117     116     1.      1.      0.
CBEAM   38      38      34      31      1.      1.      0.
CBEAM   39      39      40      37      1.      1.      0.
CBEAM   40      40      48      45      1.      1.      0.
CBEAM   41      41      57      54      1.      1.      0.
CBEAM   42      42      69      66      1.      1.      0.
CBEAM   43      43      82      94      1.      1.      0.
CBEAM   44      44      94      118     1.      1.      0.
CBEAM   45      45      118     121     1.      1.      0.
CBEAM   46      46      115     79      1.      1.      0.
CBEAM   47      47      79      120     1.      1.      0.
CBEAM   48      48      120     114     1.      1.      0.
CBEAM   49      49      31      37      1.      1.      0.      +49BM
+49BM   46
CBEAM   50      50      37      45      1.      1.      0.
CBEAM   51      51      45      54      1.      1.      0.
CBEAM   52      52      54      66      1.      1.      0.
CBEAM   53      53      66      121     1.      1.      0.      +53BM
+53BM           456
CBEAM   54      54      121     114     1.      1.      0.      +54BM
+54BM   456
CBEAM   55      55      118     119     1.      1.      0.
CBEAM   56      56      119     120     1.      1.      0.
CBEAM   57      57      94      79      1.      1.      0.
CBEAM   141     141     467     274     1.      1.      0.
CBEAM   142     142     274     465     1.      1.      0.
CBEAM   143     143     465     275     1.      1.      0.
CBEAM   144     144     275     278     1.      1.      0.
CBEAM   145     145     278     280     1.      1.      0.
CBEAM   146     146     280     292     1.      1.      0.
CBEAM   147     147     292     114     1.      1.      0.      +147BM
+147BM          456
CBEAM   148     148     466     273     1.      1.      0.
CBEAM   149     149     273     464     1.      1.      0.
CBEAM   150     150     464     276     1.      1.      0.
CBEAM   151     151     276     279     1.      1.      0.
CBEAM   152     152     279     290     1.      1.      0.
CBEAM   153     153     290     293     1.      1.      0.
CBEAM   154     154     293     79      1.      1.      0.      +154BM
+154BM          456
CBEAM   160     160     295     300     1.      1.      0.
CBEAM   161     161     117     300     1.      1.      0.
CBEAM   162     162     300     79      1.      1.      0.
CBEAM   163     163     79      114     1.      1.      0.
CBEAM   164     164     283     295     1.      1.      0.
CBEAM   165     165     295     294     1.      1.      0.
CBEAM   166     166     293     292     1.      1.      0.
CBEAM   167     167     282     291     1.      1.      0.
CBEAM   168     168     290     280     1.      1.      0.
CBEAM   169     169     279     271     1.      1.      0.      +169BM
+169BM  456
CBEAM   170     170     271     278     1.      1.      0.      +170BM
+170BM          56
CBEAM   171     171     281     277     1.      1.      0.
CBEAM   172     172     276     275     1.      1.      0.
CBEAM   173     173     464     465     1.      1.      0.
CBEAM   174     174     466     467     1.      1.      0.
CBEAM   175     175     271     272     1.      1.      0.      +175BM
+175BM  46
CBEAM   176     176     273     241     1.      1.      0.
CBEAM   177     177     241     299     1.      1.      0.
CBEAM   178     178     299     272     1.      1.      0.
CBEAM   179     179     272     274     1.      1.      0.
CBEAM   180     180     274     233     1.      1.      0.
CBEAM   181     181     195     296     1.      1.      0.      +181BM
+181BM  56
CBEAM   182     182     296     196     1.      1.      0.      +182BM
+182BM          56
CBEAM   1001    1001    33      39      1.      0.      0.
CBEAM   1002    1002    39      47      1.      0.      0.
CBEAM   1003    1003    47      56      1.      0.      0.
CBEAM   1004    1004    56      68      1.      0.      0.
CBEAM   1005    1005    68      81      1.      0.      0.
CBEAM   1007    1007    32      38      1.      0.      0.
CBEAM   1009    1009    30      38      1.      0.      0.
CBEAM   1010    1010    38      46      1.      0.      0.
CBEAM   1011    1011    46      55      1.      0.      0.
CBEAM   1012    1012    55      67      1.      0.      0.
CBEAM   1013    1013    67      80      1.      0.      0.
CBEAM   1014    1014    181     182     1.      0.      0.
CBEAM   1015    1015    182     183     1.      0.      0.
CBEAM   1016    1016    183     184     1.      0.      0.
CBEAM   1017    1017    184     185     1.      0.      0.
CBEAM   1018    1018    185     186     1.      0.      0.
CBEAM   1020    1020    29      44      1.      0.      0.
CBEAM   1022    1022    27      44      1.      0.      0.
CBEAM   1023    1023    44      53      1.      0.      0.
CBEAM   1024    1024    53      65      1.      0.      0.
CBEAM   1025    1025    65      78      1.      0.      0.
CBEAM   1026    1026    187     188     1.      0.      0.      +1026BM
+1026BM 56
CBEAM   1027    1027    188     189     1.      0.      0.
CBEAM   1028    1028    189     190     1.      0.      0.
CBEAM   1029    1029    190     191     1.      0.      0.
CBEAM   1031    1031    26      52      1.      0.      0.
CBEAM   1033    1033    25      52      1.      0.      0.
CBEAM   1034    1034    52      64      1.      0.      0.
CBEAM   1035    1035    64      245     1.      0.      0.
CBEAM   1036    1036    64      77      1.      0.      0.
CBEAM   1037    1037    245     77      1.      0.      0.
CBEAM   1038    1038    192     193     1.      0.      0.
CBEAM   1039    1039    193     63      1.      0.      0.
CBEAM   1040    1040    63      245     1.      0.      0.
CBEAM   1041    1041    245     76      1.      0.      0.
CBEAM   1043    1043    24      51      1.      0.      0.
CBEAM   1045    1045    23      51      1.      0.      0.
CBEAM   1046    1046    51      62      1.      0.      0.
CBEAM   1047    1047    22      62      1.      0.      0.
CBEAM   1048    1048    62      244     1.      0.      0.
CBEAM   1049    1049    244     75      1.      0.      0.
CBEAM   1050    1050    75      88      1.      0.      0.      +1050BM
CBEAM   1051    1051    21      61      1.      0.      0.
CBEAM   1052    1052    61      243     1.      0.      0.
CBEAM   1053    1053    243     74      1.      0.      0.      +1053BM
+1053BM         56
CBEAM   1054    1054    74      87      1.      0.      0.      +1054BM
CBEAM   1056    1056    20      60      1.      0.      0.
CBEAM   1057    1057    60      242     1.      0.      0.
CBEAM   1058    1058    242     73      1.      0.      0.      +1058BM
+1058BM         56
CBEAM   1059    1059    73      86      1.      0.      0.      +1059BM
CBEAM   1060    1060    19      143     1.      0.      0.
CBEAM   1061    1061    143     72      1.      0.      0.
CBEAM   1062    1062    72      85      1.      0.      0.      +1062BM
CBEAM   1071    1071    33      32      0.      1.      0.
CBEAM   1072    1072    32      30      0.      1.      0.
CBEAM   1073    1073    30      181     0.      1.      0.
CBEAM   1074    1074    181     29      0.      1.      0.
CBEAM   1075    1075    39      38      0.      1.      0.
CBEAM   1076    1076    38      182     0.      1.      0.
CBEAM   1077    1077    182     29      0.      1.      0.
CBEAM   1078    1078    29      27      0.      1.      0.
CBEAM   1079    1079    27      187     0.      1.      0.
CBEAM   1080    1080    187     26      0.      1.      0.
CBEAM   1081    1081    47      46      0.      1.      0.
CBEAM   1082    1082    46      183     0.      1.      0.
CBEAM   1083    1083    183     44      0.      1.      0.
CBEAM   1084    1084    44      188     0.      1.      0.
CBEAM   1085    1085    188     26      0.      1.      0.
CBEAM   1086    1086    26      25      0.      1.      0.
CBEAM   1087    1087    25      192     0.      1.      0.
CBEAM   1088    1088    192     24      0.      1.      0.
CBEAM   1089    1089    24      23      0.      1.      0.
CBEAM   1090    1090    23      22      0.      1.      0.
CBEAM   1091    1091    56      55      0.      1.      0.
CBEAM   1092    1092    55      184     0.      1.      0.
CBEAM   1093    1093    184     53      0.      1.      0.
CBEAM   1094    1094    53      189     0.      1.      0.
CBEAM   1095    1095    189     52      0.      1.      0.
CBEAM   1096    1096    52      193     0.      1.      0.
CBEAM   1097    1097    193     51      0.      1.      0.
CBEAM   1098    1098    51      22      0.      1.      0.      +1098BM
+1098BM         56
CBEAM   1099    1099    22      21      0.      1.      0.
CBEAM   1100    1100    21      20      0.      1.      0.
CBEAM   1101    1101    20      19      0.      1.      0.
CBEAM   1102    1102    68      67      0.      1.      0.
CBEAM   1103    1103    67      185     0.      1.      0.
CBEAM   1104    1104    185     65      0.      1.      0.
CBEAM   1105    1105    65      190     0.      1.      0.
CBEAM   1106    1106    190     64      0.      1.      0.
CBEAM   1107    1107    64      63      0.      1.      0.
CBEAM   1108    1108    63      62      0.      1.      0.
CBEAM   1109    1109    62      61      0.      1.      0.
CBEAM   1110    1110    61      60      0.      1.      0.
CBEAM   1111    1111    60      19      0.      1.      0.
CBEAM   1112    1112    245     244     0.      1.      0.
CBEAM   1113    1113    244     243     0.      1.      0.
CBEAM   1114    1114    243     242     0.      1.      0.
CBEAM   1115    1115    242     143     0.      1.      0.
CBEAM   1116    1116    81      80      0.      1.      0.
CBEAM   1117    1117    80      186     0.      1.      0.
CBEAM   1118    1118    186     78      0.      1.      0.
CBEAM   1119    1119    78      191     0.      1.      0.
CBEAM   1120    1120    191     77      0.      1.      0.
CBEAM   1121    1121    77      76      0.      1.      0.
CBEAM   1122    1122    76      75      0.      1.      0.
CBEAM   1123    1123    75      74      0.      1.      0.
CBEAM   1124    1124    74      73      0.      1.      0.
CBEAM   1125    1125    73      72      0.      1.      0.
CBEAM   1126    1126    88      87      0.      1.      0.      +1126BM
CBEAM   1127    1127    87      86      0.      1.      0.
CBEAM   1128    1128    86      85      0.      1.      0.      +1128BM
CBEAM   1131    1131    7       18      1.      0.      0.
CBEAM   1132    1132    6       16      1.      0.      0.
CBEAM   1133    1133    16      17      1.      0.      0.
CBEAM   1134    1134    17      30      1.      0.      0.      +BM1134
+BM1134 5
CBEAM   1135    1135    176     180     1.      0.      0.
CBEAM   1136    1136    5       14      1.      0.      0.
CBEAM   1137    1137    14      15      1.      0.      0.
CBEAM   1138    1138    15      27      1.      0.      0.      +BM1138
+BM1138 5
CBEAM   1139    1139    175     179     1.      0.      0.
CBEAM   1140    1140    4       12      1.      0.      0.
CBEAM   1141    1141    12      13      1.      0.      0.
CBEAM   1142    1142    13      25      1.      0.      0.      +BM1142
+BM1142 5
CBEAM   1143    1143    174     178     1.      0.      0.
CBEAM   1144    1144    3       10      1.      0.      0.
CBEAM   1145    1145    10      11      1.      0.      0.
CBEAM   1146    1146    11      23      1.      0.      0.      +BM1146
+BM1146 5
CBEAM   1147    1147    173     177     1.      0.      0.
CBEAM   1148    1148    2       194     1.      0.      0.
CBEAM   1149    1149    194     9       1.      0.      0.
CBEAM   1150    1150    9       20      1.      0.      0.      +BM1150
+BM1150 5
CBEAM   1151    1151    1       8       1.      0.      0.
CBEAM   1152    1152    6       7       1.      0.      0.
CBEAM   1153    1153    176     6       1.      0.      0.
CBEAM   1154    1154    5       176     1.      0.      0.
CBEAM   1155    1155    175     5       1.      0.      0.
CBEAM   1156    1156    4       175     1.      0.      0.
CBEAM   1157    1157    174     4       1.      0.      0.
CBEAM   1158    1158    3       174     1.      0.      0.
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CBEAM   1159    1159    173     3       1.      0.      0.
CBEAM   1160    1160    2       173     1.      0.      0.
CBEAM   1161    1161    1       2       1.      0.      0.
CBEAM   1162    1162    16      18      1.      0.      0.
CBEAM   1163    1163    180     16      1.      0.      0.
CBEAM   1164    1164    14      180     1.      0.      0.
CBEAM   1165    1165    179     14      1.      0.      0.
CBEAM   1166    1166    12      179     1.      0.      0.
CBEAM   1167    1167    178     12      1.      0.      0.
CBEAM   1168    1168    10      178     1.      0.      0.
CBEAM   1169    1169    177     10      1.      0.      0.
CBEAM   1170    1170    194     177     1.      0.      0.
CBEAM   1171    1171    8       194     1.      0.      0.
CBEAM   1181    1181    81      95      1.      0.      0.      +BM1181
+BM1181         456
CBEAM   1182    1182    95      142     1.      0.      0.
CBEAM   1183    1183    142     101     1.      0.      0.
CBEAM   1184    1184    101     107     1.      0.      0.
CBEAM   1185    1185    107     113     1.      0.      0.
CBEAM   1186    1186    93      141     1.      0.      0.
CBEAM   1187    1187    141     100     1.      0.      0.
CBEAM   1188    1188    100     106     1.      0.      0.
CBEAM   1189    1189    106     112     1.      0.      0.
CBEAM   1190    1190    186     124     1.      0.      0.      +BM1190
+BM1190         456
CBEAM   1191    1191    124     140     1.      0.      0.
CBEAM   1192    1192    140     127     1.      0.      0.
CBEAM   1193    1193    127     130     1.      0.      0.
CBEAM   1194    1194    130     133     1.      0.      0.
CBEAM   1195    1195    92      139     1.      0.      0.
CBEAM   1196    1196    139     99      1.      0.      0.
CBEAM   1197    1197    99      105     1.      0.      0.
CBEAM   1198    1198    105     111     1.      0.      0.
CBEAM   1199    1199    191     123     1.      0.      0.      +BM1199
+BM1199         456
CBEAM   1200    1200    123     138     1.      0.      0.
CBEAM   1201    1201    138     126     1.      0.      0.
CBEAM   1202    1202    126     129     1.      0.      0.
CBEAM   1203    1203    129     132     1.      0.      0.
CBEAM   1204    1204    91      137     1.      0.      0.
CBEAM   1205    1205    137     98      1.      0.      0.
CBEAM   1206    1206    98      104     1.      0.      0.
CBEAM   1207    1207    104     110     1.      0.      0.
CBEAM   1208    1208    122     136     1.      0.      0.
CBEAM   1209    1209    136     125     1.      0.      0.
CBEAM   1210    1210    125     128     1.      0.      0.
CBEAM   1211    1211    128     131     1.      0.      0.
CBEAM   1212    1212    76      90      1.      0.      0.      +BM1212
+BM1212         456
CBEAM   1213    1213    90      135     1.      0.      0.
CBEAM   1214    1214    135     97      1.      0.      0.
CBEAM   1215    1215    97      103     1.      0.      0.
CBEAM   1216    1216    103     109     1.      0.      0.
CBEAM   1217    1217    89      134     1.      0.      0.
CBEAM   1218    1218    134     96      1.      0.      0.
CBEAM   1219    1219    96      102     1.      0.      0.
CBEAM   1220    1220    102     108     1.      0.      0.
CBEAM   1231    1231    141     142     1.      0.      0.
CBEAM   1232    1232    140     141     1.      0.      0.
CBEAM   1233    1233    139     140     1.      0.      0.
CBEAM   1234    1234    138     139     1.      0.      0.
CBEAM   1235    1235    137     138     1.      0.      0.
CBEAM   1236    1236    136     137     1.      0.      0.
CBEAM   1237    1237    135     136     1.      0.      0.
CBEAM   1238    1238    134     135     1.      0.      0.
CBEAM   1241    1241    100     101     1.      0.      0.
CBEAM   1242    1242    127     100     1.      0.      0.
CBEAM   1243    1243    99      127     1.      0.      0.
CBEAM   1244    1244    126     99      1.      0.      0.
CBEAM   1245    1245    98      126     1.      0.      0.
CBEAM   1246    1246    125     98      1.      0.      0.
CBEAM   1247    1247    97      125     1.      0.      0.
CBEAM   1248    1248    96      97      1.      0.      0.
CBEAM   1251    1251    106     107     1.      0.      0.
CBEAM   1252    1252    130     106     1.      0.      0.
CBEAM   1253    1253    105     130     1.      0.      0.
CBEAM   1254    1254    129     105     1.      0.      0.
CBEAM   1255    1255    104     129     1.      0.      0.
CBEAM   1256    1256    128     104     1.      0.      0.
CBEAM   1257    1257    103     128     1.      0.      0.
CBEAM   1258    1258    102     103     1.      0.      0.
CBEAM   1261    1261    112     113     1.      0.      0.
CBEAM   1262    1262    133     112     1.      0.      0.
CBEAM   1263    1263    111     133     1.      0.      0.
CBEAM   1264    1264    132     111     1.      0.      0.
CBEAM   1265    1265    110     132     1.      0.      0.
CBEAM   1266    1266    131     110     1.      0.      0.
CBEAM   1267    1267    109     131     1.      0.      0.
CBEAM   1268    1268    108     109     1.      0.      0.
CBEAM   2001    2001    251     506     1.      1.      0.      +BM2001
+BM2001 456
CBEAM   2002    2002    506     233     1.      1.      0.
CBEAM   2003    2003    233     517     1.      1.      0.
CBEAM   2004    2004    517     262     1.      1.      0.      +BM2004
+BM2004         456
CBEAM   2005    2005    252     507     1.      1.      0.      +BM2005
+BM2005 456
CBEAM   2006    2006    507     257     1.      1.      0.
CBEAM   2007    2007    257     518     1.      1.      0.
CBEAM   2008    2008    518     262     1.      1.      0.      +BM2008
+BM2008         456
CBEAM   2009    2009    253     508     1.      1.      0.      +BM2009
+BM2009 456
CBEAM   2010    2010    508     258     1.      1.      0.
CBEAM   2011    2011    258     519     1.      1.      0.
CBEAM   2012    2012    519     263     1.      1.      0.      +BM2012
+BM2012         456
CBEAM   2013    2013    254     509     1.      1.      0.      +BM2013
+BM2013 456
CBEAM   2014    2014    509     259     1.      1.      0.
CBEAM   2015    2015    259     520     1.      1.      0.
CBEAM   2016    2016    520     264     1.      1.      0.      +BM2016
+BM2016         456
CBEAM   2017    2017    255     510     1.      1.      0.      +BM2017
+BM2017 456
CBEAM   2018    2018    510     260     1.      1.      0.
CBEAM   2019    2019    260     521     1.      1.      0.
CBEAM   2020    2020    521     265     1.      1.      0.      +BM2020
+BM2020         456
CBEAM   2021    2021    256     511     1.      1.      0.      +BM2021
+BM2021 456
CBEAM   2022    2022    511     261     1.      1.      0.      +BM2022
+BM2022         456
CBEAM   2023    2023    261     522     1.      1.      0.      +BM2023
+BM2023 456
CBEAM   2024    2024    522     266     1.      1.      0.      +BM2024
+BM2024         456
CBEAM   2031    2031    251     501     1.      1.      0.      +BM2031
+BM2031 456
CBEAM   2032    2032    501     252     1.      1.      0.
CBEAM   2033    2033    252     502     1.      1.      0.
CBEAM   2034    2034    502     253     1.      1.      0.
CBEAM   2035    2035    253     503     1.      1.      0.
CBEAM   2036    2036    503     254     1.      1.      0.
CBEAM   2037    2037    254     504     1.      1.      0.
CBEAM   2038    2038    504     255     1.      1.      0.
CBEAM   2039    2039    255     505     1.      1.      0.
CBEAM   2040    2040    505     256     1.      1.      0.      +BM2040
+BM2040         456
CBEAM   2041    2041    233     512     1.      1.      0.
CBEAM   2042    2042    512     257     1.      1.      0.
CBEAM   2043    2043    257     513     1.      1.      0.
CBEAM   2044    2044    513     258     1.      1.      0.
CBEAM   2045    2045    258     514     1.      1.      0.
CBEAM   2046    2046    514     259     1.      1.      0.
CBEAM   2047    2047    259     515     1.      1.      0.
CBEAM   2048    2048    515     260     1.      1.      0.
CBEAM   2049    2049    260     516     1.      1.      0.
CBEAM   2050    2050    516     261     1.      1.      0.      +BM2050
+BM2050         456
CBEAM   2051    2051    262     523     1.      1.      0.      +BM2051
+BM2051 456
CBEAM   2052    2052    523     263     1.      1.      0.
CBEAM   2053    2053    263     524     1.      1.      0.
CBEAM   2054    2054    524     264     1.      1.      0.
CBEAM   2055    2055    264     525     1.      1.      0.
CBEAM   2056    2056    525     265     1.      1.      0.
CBEAM   2057    2057    265     526     1.      1.      0.
CBEAM   2058    2058    526     266     1.      1.      0.      +BM2058
+BM2058         456
CBEAM   3026    3026    19      3020    0.      1.      0.
CBEAM   3027    3027    3016    3021    0.      1.      0.
CBEAM   3028    3028    3017    3018    1.      0.      0.
CBEAM   3029    3029    3018    3019    1.      0.      0.
CBEAM   3030    3030    3019    3020    1.      0.      0.
CBEAM   3031    3031    3020    3021    1.      0.      0.
CBEAM   3032    3032    3021    3022    1.      0.      0.      +3032
+3032           5
CBEAM   5002    5002    153     267     1.      0.      0.
CBEAM   5051    5051    156     458     1.      0.      0.
CBEAM   5052    5052    458     459     1.      0.      0.
CBEAM   5053    5053    459     268     1.      0.      0.
CELAS2  61      36.6E6  34      5       35      5
CELAS2  62      71.0E6  40      5       41      5
CELAS2  63      94.1E6  48      5       49      5
CELAS2  64      132.4E6 57      5       58      5
CELAS2  65      110.0E6 69      5       70      5
CELAS2  66      51.7E6  82      5       83      5
CELAS2  67      5.0E6   115     5       116     5
CELAS2  191     11.25E6 277     5       276     5
CELAS2  192     22.0E6  291     5       290     5
CELAS2  193     9.68E6  294     5       293     5
CELAS2  194     156610. 298     3       195     3
CELAS2  195     67829.  284     3       196     3
CELAS2  1172    5650000.17      4       30      4
CELAS2  1173    5590000.15      4       27      4
CELAS2  1174    1600000.13      4       25      4
CELAS2  1175    2030000.11      4       23      4
CELAS2  1221    3307000.142     4       141     4
CELAS2  1222    268300. 141     4       140     4
CELAS2  1223    137300. 140     4       139     4
CELAS2  1224    105200. 139     4       138     4
CELAS2  1225    85600.  138     4       137     4
CELAS2  1226    69900.  137     4       136     4
CELAS2  1227    57700.  136     4       135     4
CELAS2  1228    40000.  135     4       134     4
CELAS2  1229    6229750.142     4       119     4
CONM1   301     19      0                               +301
+301    9.565
CONM1   302     72      0                               +302
+302    6.770
CONM1   303     20      0                               +303
+303    7.972
CONM1   304     60      0                               +304
+304    10.110
CONM1   305     73      0                               +305
+305    7.755
CONM1   306     21      0                               +306
+306    13.712
CONM1   307     61      0                               +307
+307    20.285
CONM1   308     74      0                               +308
+308    9.982
CONM1   309     51      0                               +309
+309    32.156
CONM1   310     62      0                               +310
+310    25.281
CONM1   311     75      0                               +311
+311    14.285
CONM1   312     26      0                               +312
+312    42.942
CONM1   313     52      0                               +313
+313    57.288
CONM1   314     64      0                               +314
+314    46.648
CONM1   315     77      0                               +315
+315    20.983
CONM1   316     29      0                               +316
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+316    60.677
CONM1   317     44      0                                               +317
+317    80.964
CONM1   318     53      0                                               +318
+318    74.861
CONM1   319     65      0                                               +319
+319    56.266
CONM1   320     78      0                                               +320
+320    28.341
CONM1   321     33      0                                               +321
+321    37.854
CONM1   322     39      0                                               +322
+322    99.621
CONM1   323     47      0                                               +323
+323    105.244
CONM1   324     56      0                                               +324
+324    95.811
CONM1   325     68      0                                               +325
+325    83.620
CONM1   326     81      0                                               +326
+326    33.148
CONM1   341     85      0                                               +341
+341    .6
CONM1   342     86      0                                               +342
+342    1.6
CONM1   343     87      0                                               +343
+343    1.8
CONM1   344     88      0                                               +344
+344    1.
CONM1   345     6       0                                               +345
+345    12.03
CONM1   346     17      0                                               +346
+346    57.78
CONM1   347     5       0                                               +347
+347    10.08
CONM1   348     15      0                                               +348
+348    42.72
CONM1   349     4       0                                               +349
+349    6.92
CONM1   350     13      0                                               +350
+350    27.67
CONM1   351     3       0                                               +351
+351    5.17
CONM1   352     11      0                                               +352
+352    27.65
CONM1   353     2       0                                               +353
+353    4.08
CONM1   354     9       0                                               +354
+354    3.71
CONM1   355     95      0                                               +355
+355    9.133
CONM1   356     107     0                                               +356
+356    6.765
CONM1   357     113     0                                               +357
+357    .022
CONM1   358     93      0                                               +358
+358    10.32
CONM1   359     106     0                                               +359
+359    10.12
CONM1   360     112     0                                               +360
+360    .149
CONM1   361     124     0                                               +361
+361    5.816
CONM1   362     130     0                                               +362
+362    7.986
CONM1   363     133     0                                               +363
+363    .998
CONM1   364     92      0                                               +364
+364    4.56
CONM1   365     105     0                                               +365
+365    6.797
CONM1   366     111     0                                               +366
+366    .952
CONM1   367     123     0                                               +367
+367    3.296
CONM1   368     129     0                                               +368
+368    4.727
CONM1   369     132     0                                               +369
+369    .647
CONM1   370     91      0                                               +370
+370    2.069
CONM1   371     104     0                                               +371
+371    3.014
CONM1   372     110     0                                               +372
+372    .477
CONM1   373     122     0                                               +373
+373    1.784
CONM1   374     128     0                                               +374
+374    2.632
CONM1   375     131     0                                               +375
+375    .435
CONM1   376     90      0                                               +376
+376    1.644
CONM1   377     103     0                                               +377
+377    2.354
CONM1   378     109     0                                               +378
+378    .272
CONM1   379     89      0                                               +379
+379    .651
CONM1   380     102     0                                               +380
+380    1.075
CONM1   381     108     0                                               +381
+381    .284
CONM1   391     163     0                                               +391
+391    314.21
CONM1   392     153     0                                               +392
+392    463.77
CONM1   393     154     0                                               +393
+393    870.68
CONM1   394     155     0                                               +394
+394    1299.38
CONM1   395     156     0                                               +395
+395    1545.78
CONM1   396     42      0                                               +396
+396    1799.25
CONM1   397     71      0                                               +397
+397    1412.77
CONM1   398     286     0                                               +398
+398    893.77
CONM1   399     284     0                                               +399
+399    335.19
CONM1   400     281     0                                               +400
+400    708.33
CONM1   401     163     0       314.21
CONM1   402     153     0       463.77
CONM1   403     154     0       870.68
CONM1   404     155     0       1299.38
CONM1   405     156     0       1545.78
CONM1   406     42      0       2036.16
CONM1   407     71      0       2468.11
CONM1   408     286     0       893.77
CONM1   409     284     0       311.29
CONM1   410     281     0       796.72
CONM1   411     153     0                                               +411
+411                                                                    +411A
+411A           119126.
CONM1   412     154     0                                               +412
+412                                                                    +412A
+412A           498740.
CONM1   413     155     0                                               +413
+413                                                                    +413A
+413A           233410.
CONM1   414     156     0                                               +414
+414                                                                    +414A
+414A           865169.
CONM1   415     42      0                                               +415
+415                                                                    +415A
+415A           1051483.
CONM1   416     71      0                                               +416
+416                                                                    +416A
+416A           1042917.
CONM1   417     286     0                                               +417
+417                                                                    +417A
+417A           556929.
CONM1   418     284     0                                               +418
+418                                                                    +418A
+418A           756147.
CONM1   430     195     0                                               +430
+430    -82.94
CONM1   431     296     0                                               +431
+431                            3803477.
CONM1   432     296     0                                               +432
+432    2073.44
CONM1   433     42      0                       12204.0
CONM1   434     437     0                                               +434
+434                                                                    +434A
+434A                                                   19.7E6
CONM1   435     281     0                                               +435
+435                                                                    +435A
+435A                                                   945062.
CONM1   436     410     0                                               +436
+436                                                                    +436A
+436A           502624.
CONM1   437     410     0                                               +437
+437                                                                    +437A
+437A                                                   3604069.
CONM1   438     410     0       1990.5
CONM1   446     251     0                                               +446
+446    4.65
CONM1   447     252     0                                               +447
+447    5.123
CONM1   448     253     0                                               +448
+448    4.812
CONM1   449     254     0                                               +449
+449    3.069
CONM1   450     255     0                                               +450
+450    1.73
CONM1   451     256     0                                               +451
+451    2.547
CONM1   452     233     0                                               +452
+452    176.302
CONM1   453     257     0                                               +453
+453    31.053
CONM1   454     258     0                                               +454
+454    17.674
CONM1   455     259     0                                               +455
+455    11.742
CONM1   456     260     0                                               +456
+456    7.391
CONM1   457     261     0                                               +457
+457    2.877
CONM1   458     262     0                                               +458
+458    3.675
CONM1   459     263     0                                               +459
+459    3.064
CONM1   460     264     0                                               +460
+460    2.838
CONM1   461     265     0                                               +461
+461    2.73
CONM1   462     266     0                                               +462
+462    .976
CONM1   501     407     0       18.24
CONM1   502     409     0       24.64
CONM1   503     367     0       23.43
CONM1   504     408     0       30.93
CONM1   505     368     0       4.55
CONM1   506     359     0       15.9
CONM1   507     384     0       15.24
CONM1   508     389     0       .75
CONM1   509     369     0       3.81
CONM1   510     360     0       6.67
CONM1   511     385     0       5.77
CONM1   512     390     0       1.11
CONM1   513     370     0       2.55
CONM1   514     361     0       3.55
CONM1   515     386     0       3.1
CONM1   516     391     0       .93
CONM1   517     371     0       1.12
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CONM1   518     362     0       2.9
CONM1   519     387     0       2.4
CONM1   520     392     0       .59
CONM1   521     393     0       .37
CONM1   522     373     0       1.94
CONM1   523     364     0       .48
CONM1   524     381     0       2.66
CONM1   525     383     0       .89
CONM1   526     281                                                     +526
+526                                    822933.
CONM1   3042    3018            56.69           56.69                   +3042
+3042   50.69                           38266.                          +3042A
+3042A          0.                                              35266.
CONM1   3043    3019                                                    +3043
+3043   -4.70
CONM1   3044    3022            35.01           35.01                   +3044
+3044   50.01
CONM1   3047    3017                                                    +3047
+3047   .010
CONM2   3501    3500            502.    0.      -2.     0.              +000001
++000001698549.2        8160.8                  649152.0                +000002
CONM2   3504    3501            138.    0.      0.      0.              +000003
++00000366538.01        6769.7                  62828.60                +000004
CONROD  183     272     233     2               16.0875
CONROD  2201    233     1233    2       .0001
CONROD  2202    233     2233    2       .0001
CONROD  2203    251     1251    2       .0001
CONROD  2204    251     2251    2       .0001
CONROD  2205    252     1252    2       .0001
CONROD  2206    252     2252    2       .0001
CONROD  2207    253     1253    2       .0001
CONROD  2208    253     2253    2       .0001
CONROD  2209    254     1254    2       .0001
CONROD  2210    254     2254    2       .0001
CONROD  2211    255     1255    2       .0001
CONROD  2212    255     2255    2       .0001
CONROD  2213    256     1256    2       .0001
CONROD  2214    256     2256    2       .0001
CONROD  2215    257     1257    2       .0001
CONROD  2216    257     2257    2       .0001
CONROD  2217    258     1258    2       .0001
CONROD  2218    258     2258    2       .0001
CONROD  2219    259     1259    2       .0001
CONROD  2220    259     2259    2       .0001
CONROD  2221    260     1260    2       .0001
CONROD  2222    260     2260    2       .0001
CONROD  2223    261     1261    2       .0001
CONROD  2224    261     2261    2       .0001
CONROD  2225    262     1262    2       .0001
CONROD  2226    262     2262    2       .0001
CONROD  2227    263     1263    2       .0001
CONROD  2228    263     2263    2       .0001
CONROD  2229    264     1264    2       .0001
CONROD  2230    264     2264    2       .0001
CONROD  2231    265     1265    2       .0001
CONROD  2232    265     2265    2       .0001
CONROD  2233    266     1266    2       .0001
CONROD  2234    266     2266    2       .0001
CONROD  3033    3018    3020    2               20.
CONROD  3034    3020    3022    2               20.
CORD1R  5       701     702     703
CORD2C *3               0               -63.574         -294.247        *CORD3A
*CORD3A 0.              -143.398002     -351.530085     0.              +CORD3B
+CORD3B -63.574 -294.247100.
CORD2R  1       0       -62.153 -293.2270.      -62.153 -293.227100.    *CORD1
*CORD1  19.092002       -234.923915     0.
CORD2R  7       0       -41.5   -378.02 0.      -41.5   -378.02 100.    *CORD7
*CORD7  57.2946361      -362.5403399    0.
CQUAD4  601     601     1033    1039    1038    1032
CQUAD4  602     602     1039    1047    1046    1038
CQUAD4  603     603     1047    1056    1055    1046
CQUAD4  604     604     1056    1068    1067    1055
CQUAD4  605     605     1068    1081    1080    1067
CQUAD4  607     607     1038    1182    1181    1030
CQUAD4  608     608     1038    1046    1183    1182
CQUAD4  609     609     1046    1055    1184    1183
CQUAD4  610     610     1055    1067    1185    1184
CQUAD4  611     611     1067    1080    1186    1185
CQUAD4  613     613     1182    1183    1044    1029
CQUAD4  614     614     1183    1184    1053    1044
CQUAD4  615     615     1184    1185    1065    1053
CQUAD4  616     616     1185    1186    1078    1065
CQUAD4  618     618     1027    1044    1188    1187
CQUAD4  619     619     1044    1053    1189    1188
CQUAD4  620     620     1053    1065    1190    1189
CQUAD4  621     621     1065    1078    1191    1190
CQUAD4  623     623     1188    1189    1052    1026
CQUAD4  624     624     1189    1190    1064    1052
CQUAD4  625     625     1190    1191    1077    1064
CQUAD4  627     627     1025    1052    1193    1192
CQUAD4  628     628     1052    1064    1063    1193
CQUAD4  632     632     1192    1193    1051    1024
CQUAD4  633     633     1193    1063    1062    1051
CQUAD4  634     634     1063    1245    1244    1062
CQUAD4  635     635     1245    1076    1075    1244
CQUAD4  639     639     1062    1061    1021    1022
CQUAD4  640     640     1062    1244    1243    1061
CQUAD4  641     641     1244    1075    1074    1243
CQUAD4  643     643     1021    1061    1060    1020
CQUAD4  644     644     1061    1243    1242    1060
CQUAD4  645     645     1243    1074    1073    1242
CQUAD4  648     648     1060    1242    1143    1019
CQUAD4  649     649     1242    1073    1072    1143
CQUAD4  661     661     1142    1101    1100    1141
CQUAD4  662     662     1101    1107    1106    1100
CQUAD4  663     663     1107    1113    1112    1106
CQUAD4  664     664     1141    1100    1127    1140
CQUAD4  665     665     1100    1106    1130    1127
CQUAD4  666     666     1106    1112    1133    1130
CQUAD4  667     667     1140    1127    1099    1139
CQUAD4  668     668     1127    1130    1105    1099
CQUAD4  669     669     1130    1133    1111    1105
CQUAD4  670     670     1139    1099    1126    1138
CQUAD4  671     671     1099    1105    1129    1126
CQUAD4  672     672     1105    1111    1132    1129
CQUAD4  673     673     1138    1126    1098    1137
CQUAD4  674     674     1126    1129    1104    1098
CQUAD4  675     675     1129    1132    1110    1104
CQUAD4  676     676     1137    1098    1125    1136
CQUAD4  677     677     1098    1104    1128    1125
CQUAD4  678     678     1104    1110    1131    1128
CQUAD4  679     679     1136    1125    1097    1135
CQUAD4  680     680     1125    1128    1103    1097
CQUAD4  681     681     1128    1131    1109    1103
CQUAD4  682     682     1135    1097    1096    1134
CQUAD4  683     683     1097    1103    1102    1096
CQUAD4  684     684     1103    1109    1108    1102
CQUAD4  1601    601     2033    2039    2038    2032
CQUAD4  1602    602     2039    2047    2046    2038
CQUAD4  1603    603     2047    2056    2055    2046
CQUAD4  1604    604     2056    2068    2067    2055
CQUAD4  1605    605     2068    2081    2080    2067
CQUAD4  1607    607     2038    2182    2181    2030
CQUAD4  1608    608     2038    2046    2183    2182
CQUAD4  1609    609     2046    2055    2184    2183
CQUAD4  1610    610     2055    2067    2185    2184
CQUAD4  1611    611     2067    2080    2186    2185
CQUAD4  1613    613     2182    2183    2044    2029
CQUAD4  1614    614     2183    2184    2053    2044
CQUAD4  1615    615     2184    2185    2065    2053
CQUAD4  1616    616     2185    2186    2078    2065
CQUAD4  1618    618     2027    2044    2188    2187
CQUAD4  1619    619     2044    2053    2189    2188
CQUAD4  1620    620     2053    2065    2190    2189
CQUAD4  1621    621     2065    2078    2191    2190
CQUAD4  1623    623     2188    2189    2052    2026
CQUAD4  1624    624     2189    2190    2064    2052
CQUAD4  1625    625     2190    2191    2077    2064
CQUAD4  1627    627     2025    2052    2193    2192
CQUAD4  1628    628     2052    2064    2063    2193
CQUAD4  1632    632     2192    2193    2051    2024
CQUAD4  1633    633     2193    2063    2062    2051
CQUAD4  1634    634     2063    2245    2244    2062
CQUAD4  1635    635     2245    2076    2075    2244
CQUAD4  1639    639     2062    2061    2021    2022
CQUAD4  1640    640     2062    2244    2243    2061
CQUAD4  1641    641     2244    2075    2074    2243
CQUAD4  1643    643     2021    2061    2060    2020
CQUAD4  1644    644     2061    2243    2242    2060
CQUAD4  1645    645     2243    2074    2073    2242
CQUAD4  1648    648     2060    2242    2143    2019
CQUAD4  1649    649     2242    2073    2072    2143
CQUAD4  1661    661     2142    2101    2100    2141
CQUAD4  1662    662     2101    2107    2106    2100
CQUAD4  1663    663     2107    2113    2112    2106
CQUAD4  1664    664     2141    2100    2127    2140
CQUAD4  1665    665     2100    2106    2130    2127
CQUAD4  1666    666     2106    2112    2133    2130
CQUAD4  1667    667     2140    2127    2099    2139
CQUAD4  1668    668     2127    2130    2105    2099
CQUAD4  1669    669     2130    2133    2111    2105
CQUAD4  1670    670     2139    2099    2126    2138
CQUAD4  1671    671     2099    2105    2129    2126
CQUAD4  1672    672     2105    2111    2132    2129
CQUAD4  1673    673     2138    2126    2098    2137
CQUAD4  1674    674     2126    2129    2104    2098
CQUAD4  1675    675     2129    2132    2110    2104
CQUAD4  1676    676     2137    2098    2125    2136
CQUAD4  1677    677     2098    2104    2128    2125
CQUAD4  1678    678     2104    2110    2131    2128
CQUAD4  1679    679     2136    2125    2097    2135
CQUAD4  1680    680     2125    2128    2103    2097
CQUAD4  1681    681     2128    2131    2109    2103
CQUAD4  1682    682     2135    2097    2096    2134
CQUAD4  1683    683     2097    2103    2102    2096
CQUAD4  1684    684     2103    2109    2108    2102
CQUAD8  701     701     1257    1252    1251    1233    1507    1501    +701
+701    1506    1512                                    99.5
CQUAD8  702     702     1252    1257    1258    1253    1507    1513    +702
+702    1508    1502                                    99.5
CQUAD8  703     703     1253    1258    1259    1254    1508    1514    +703
+703    1509    1503                                    99.5
CQUAD8  704     704     1254    1259    1260    1255    1509    1515    +704
+704    1510    1504                                    99.5
CQUAD8  705     705     1255    1260    1261    1256    1510    1516    +705
+705    1511    1505                                    99.5
CQUAD8  707     707     1257    1262    1263    1258    1518    1523    +707
+707    1519    1513                                    99.5
CQUAD8  708     708     1258    1263    1264    1259    1519    1524    +708
+708    1520    1514                                    99.5
CQUAD8  709     709     1259    1264    1265    1260    1520    1525    +709
+709    1521    1515                                    99.5
CQUAD8  710     710     1260    1265    1266    1261    1521    1526    +710
+710    1522    1516                                    99.5
CQUAD8  1701    701     2257    2252    2251    2233    2507    2501    +1701
+1701   2506    2512                                    99.5
CQUAD8  1702    702     2252    2257    2258    2253    2507    2513    +1702
+1702   2508    2502                                    99.5
CQUAD8  1703    703     2253    2258    2259    2254    2508    2514    +1703
+1703   2509    2503                                    99.5
CQUAD8  1704    704     2254    2259    2260    2255    2509    2515    +1704
+1704   2510    2504                                    99.5
CQUAD8  1705    705     2255    2260    2261    2256    2510    2516    +1705
+1705   2511    2505                                    99.5
CQUAD8  1707    707     2257    2262    2263    2258    2518    2523    +1707
+1707   2519    2513                                    99.5
CQUAD8  1708    708     2258    2263    2264    2259    2519    2524    +1708
+1708   2520    2514                                    99.5
CQUAD8  1709    709     2259    2264    2265    2260    2520    2525    +1709
+1709   2521    2515                                    99.5
CQUAD8  1710    710     2260    2265    2266    2261    2521    2526    +1710
+1710   2522    2516                                    99.5
CSHEAR  71      71      1034    1040    1037    1031
CSHEAR  72      72      1040    1048    1045    1037
CSHEAR  73      73      1048    1057    1054    1045
CSHEAR  74      74      1057    1069    1066    1054
CSHEAR  75      75      1069    1082    1121    1066
CSHEAR  76      76      1094    1079    1114    1121
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CSHEAR   77      71      2034    2040    2037    2031
CSHEAR   78      72      2040    2048    2045    2037
CSHEAR   79      73      2048    2057    2054    2045
CSHEAR   80      74      2057    2069    2066    2054
CSHEAR   81      75      2069    2082    2121    2066
CSHEAR   82      76      2094    2079    2114    2121
CSHEAR   201     201     1465    1464    1466    1467
CSHEAR   202     202     1275    1276    1464    1465
CSHEAR   203     203     1280    1290    1276    1275
CSHEAR   204     204     1114    1079    1293    1292
CSHEAR   205     201     2465    2464    2466    2467
CSHEAR   206     202     2275    2276    2464    2465
CSHEAR   207     203     2280    2290    2276    2275
CSHEAR   208     204     2114    2079    2293    2292
CSHEAR   642     642     1075    1088    1087    1074
CSHEAR   646     646     1074    1087    1086    1073
CSHEAR   650     650     1073    1086    1085    1072
CSHEAR   651     651     1007    1018    1016    1006
CSHEAR   652     652     1006    1016    1180    1176
CSHEAR   653     653     1176    1180    1014    1005
CSHEAR   654     654     1005    1014    1179    1175
CSHEAR   655     655     1175    1179    1012    1004
CSHEAR   656     656     1004    1012    1178    1174
CSHEAR   657     657     1174    1178    1010    1003
CSHEAR   658     658     1003    1010    1177    1173
CSHEAR   659     659     1173    1177    1194    1002
CSHEAR   660     660     1002    1194    1008    1001
CSHEAR   1642    642     2075    2088    2087    2074
CSHEAR   1646    646     2074    2087    2086    2073
CSHEAR   1650    650     2073    2086    2085    2072
CSHEAR   1651    651     2007    2018    2016    2006
CSHEAR   1652    652     2006    2016    2180    2176
CSHEAR   1653    653     2176    2180    2014    2005
CSHEAR   1654    654     2005    2014    2179    2175
CSHEAR   1655    655     2175    2179    2012    2004
CSHEAR   1656    656     2004    2012    2178    2174
CSHEAR   1657    657     2174    2178    2010    2003
CSHEAR   1658    658     2003    2010    2177    2173
CSHEAR   1659    659     2173    2177    2194    2002
CSHEAR   1660    660     2002    2194    2008    2001
CTRIA3   606     606     1032    1038    1030
CTRIA3   612     612     1181    1182    1029
CTRIA3   617     617     1029    1044    1027
CTRIA3   622     622     1187    1188    1026
CTRIA3   626     626     1026    1052    1025
CTRIA3   629     629     1064    1245    1063
CTRIA3   630     630     1064    1077    1245
CTRIA3   631     631     1077    1076    1245
CTRIA3   636     636     1051    1023    1024
CTRIA3   637     637     1051    1022    1023
CTRIA3   638     638     1062    1022    1051
CTRIA3   647     647     1019    1020    1060
CTRIA3   1606    606     2032    2038    2030
CTRIA3   1612    612     2181    2182    2029
CTRIA3   1617    617     2029    2044    2027
CTRIA3   1622    622     2187    2188    2026
CTRIA3   1626    626     2026    2052    2025
CTRIA3   1629    629     2064    2245    2063
CTRIA3   1630    630     2064    2077    2245
CTRIA3   1631    631     2077    2076    2245
CTRIA3   1636    636     2051    2023    2024
CTRIA3   1637    637     2051    2022    2023
CTRIA3   1638    638     2062    2022    2051
CTRIA3   1647    647     2019    2020    2060
CTRIA6   706     706     1262    1257    1233    1518    1512    1517    +706
+706     99.5
CTRIA6   1706    706     2262    2257    2233    2518    2512    2517    +1706
+1706    99.5
DMIG     VTAIL   0       6       1       0
DMIG     *VTAIL          357             1                               *9001
*9001    357             1               0.127440E+06
DMIG     *VTAIL          358             1                               *9002
*9002    357             1               -.217072E+05                    *9003
*9003    358             1               0.680871E+05
DMIG     *VTAIL          359             1                               *9004
*9004    357             1               0.352175E+03                    *9005
*9005    358             1               -.193333E+05                    *9006
*9006    359             1               0.717224E+05
DMIG     *VTAIL          360             1                               *9007
*9007    357             1               0.456481E+03                    *9008
*9008    358             1               -.301624E+03                    *9009
*9009    359             1               -.903472E+04                    *9010
*9010    360             1               0.507642E+05
DMIG     *VTAIL          361             1                               *9011
*9011    357             1               -.131707E+02                    *9012
*9012    358             1               0.315215E+03                    *9013
*9013    359             1               -.103102E+04                    *9014
*9014    360             1               -.504458E+04                    *9015
*9015    361             1               0.468148E+05
DMIG     *VTAIL          362             1                               *9016
*9016    357             1               0.739752E+00                    *9017
*9017    358             1               -.313943E+02                    *9018
*9018    359             1               0.841453E+02                    *9019
*9019    360             1               0.764191E+02                    *9020
*9020    361             1               -.117072E+05                    *9021
*9021    362             1               0.484915E+05
DMIG     *VTAIL          363             1                               *9022
*9022    357             1               0.363626E+00                    *9023
*9023    358             1               -.206621E+01                    *9024
*9024    359             1               0.170371E+02                    *9025
*9025    360             1               -.128679E+03                    *9026
*9026    361             1               0.142936E+04                    *9027
*9027    362             1               -.141053E+05                    *9028
*9028    363             1               0.334950E+05
DMIG     *VTAIL          364             1                               *9029
*9029    357             1               -.178665E+00                    *9030
*9030    358             1               0.286879E+01                    *9031
*9031    359             1               -.179730E+02                    *9032
*9032    360             1               0.822153E+02                    *9033
*9033    361             1               -.308830E+03                    *9034
*9034    362             1               0.163581E+04                    *9035
*9035    363             1               -.934300E+04                    *9036
*9036    364             1               0.133364E+05
DMIG     *VTAIL          367             1                               *9037
*9037    357             1               0.156429E+04                    *9038
*9038    358             1               -.126722E+05                    *9039
*9039    359             1               -.249630E+02                    *9040
*9040    360             1               0.252357E+03                    *9041
*9041    361             1               0.220342E+02                    *9042
*9042    362             1               -.348368E+01                    *9043
*9043    363             1               0.213553E-02                    *9044
*9044    364             1               0.287588E+00                    *9045
*9045    367             1               0.573159E+05
DMIG     *VTAIL          368             1                               *9046
*9046    357             1               0.150006E+03                    *9047
*9047    358             1               -.349447E+04                    *9048
*9048    359             1               -.184666E+05                    *9049
*9049    360             1               -.597411E+03                    *9050
*9050    361             1               0.413201E+03                    *9051
*9051    362             1               -.489800E+02                    *9052
*9052    363             1               -.271009E+00                    *9053
*9053    364             1               -.202789E+01                    *9054
*9054    367             1               -.502776E+04                    *9055
*9055    368             1               0.246725E+05
DMIG     *VTAIL          369             1                               *9056
*9056    357             1               0.292477E+03                    *9057
*9057    358             1               0.106678E+04                    *9058
*9058    359             1               -.372974E+04                    *9059
*9059    360             1               -.163066E+05                    *9060
*9060    361             1               -.720338E+03                    *9061
*9061    362             1               0.400484E+03                    *9062
*9062    363             1               0.516836E+00                    *9063
*9063    364             1               -.141972E+02                    *9064
*9064    367             1               0.245134E+03                    *9065
*9065    368             1               -.625047E+04                    *9066
*9066    369             1               0.208907E+05
DMIG     *VTAIL          370             1                               *9067
*9067    357             1               0.109520E+02                    *9068
*9068    358             1               -.429165E+02                    *9069
*9069    359             1               0.371999E+03                    *9070
*9070    360             1               -.238343E+04                    *9071
*9071    361             1               -.147446E+05                    *9072
*9072    362             1               0.690143E+03                    *9073
*9073    363             1               0.723676E+03                    *9074
*9074    364             1               0.244021E+02                    *9075
*9075    367             1               -.574195E+02                    *9076
*9076    368             1               0.416297E+03                    *9077
*9077    369             1               -.416404E+04                    *9078
*9078    370             1               0.182966E+05
DMIG     *VTAIL          371             1                               *9079
*9079    357             1               -.319898E+00                    *9080
*9080    358             1               -.105520E+02                    *9081
*9081    359             1               0.537074E+02                    *9082
*9082    360             1               0.115046E+03                    *9083
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*9085    363             1               0.208463E+04                    *9086
*9086    364             1               -.271085E+03                    *9087
*9087    367             1               0.123231E+02                    *9088
*9088    368             1               -.234544E+03                    *9089
*9089    369             1               0.874696E+03                    *9090
*9090    370             1               -.744486E+04                    *9091
*9091    371             1               0.300624E+05
DMIG     *VTAIL          372             1                               *9092
*9092    357             1               0.463602E+00                    *9093
*9093    358             1               -.677371E+01                    *9094
*9094    359             1               -.134083E+02                    *9095
*9095    360             1               0.577641E+02                    *9096
*9096    361             1               0.669330E+02                    *9097
*9097    362             1               -.915742E+03                    *9098
*9098    363             1               -.544593E+04                    *9099
*9099    364             1               0.116824E+04                    *9100
*9100    367             1               -.794538E+01                    *9101
*9101    368             1               0.789193E+02                    *9102
*9102    369             1               -.316023E+03                    *9103
*9103    370             1               0.187626E+04                    *9104
*9104    371             1               -.192798E+05                    *9105
*9105    372             1               0.276338E+05
DMIG     *VTAIL          373             1                               *9106
*9106    357             1               0.484957E-02                    *9107
*9107    358             1               0.440965E+00                    *9108
*9108    359             1               -.691597E+00                    *9109
*9109    360             1               -.875753E+00                    *9110
*9110    361             1               0.363362E+02                    *9111
*9111    362             1               0.411035E+01                    *9112
*9112    363             1               -.163347E+04                    *9113
*9113    364             1               -.258823E+04                    *9114
*9114    367             1               0.345739E+00                    *9115
*9115    368             1               -.422117E+01                    *9116
*9116    369             1               0.101714E+02                    *9117
*9117    370             1               -.633944E+02                    *9118
*9118    371             1               0.270474E+04                    *9119
*9119    372             1               -.730833E+04                    *9120
*9120    373             1               0.703131E+04
DMIG     *VTAIL          375             1                               *9121
*9121    357             1               -.230046E+04                    *9122
*9122    358             1               -.497159E+05                    *9123
*9123    359             1               0.157355E+04                    *9124
*9124    360             1               0.126726E+04                    *9125
*9125    361             1               0.195618E+03                    *9126
*9126    362             1               -.247898E+02                    *9127
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*9130    368             1               -.142639E+04                    *9131
*9131    369             1               0.123205E+04                    *9132
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DMIG     *VTAIL          376             1                               *9137
*9137    357             1               0.922286E+03                    *9138
*9138    358             1               0.349061E+04                    *9139
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*9142    362             1               -.740884E+01                    *9143
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DMIG    *VTAIL       377        1                               *9154
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*9165   370          1          0.158823E+04                    *9166
*9166   371          1          0.561757E+03                    *9167
*9167   372          1          0.690199E+02                    *9168
*9168   373          1          0.714289E+01                    *9169
*9169   375          1          0.363833E+04                    *9170
*9170   376          1          -.187741E+05                    *9171
*9171   377          1          0.775901E+05
DMIG    *VTAIL       378        1                               *9172
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*9177   362          1          0.139574E+04                    *9178
*9178   363          1          0.872899E+03                    *9179
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*9184   371          1          0.140030E+04                    *9185
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*9186   373          1          0.127903E+03                    *9187
*9187   375          1          -.234087E+03                    *9188
*9188   376          1          0.178520E+04                    *9189
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*9198   364          1          0.100000E+04                    *9199
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*9212   358          1          0.121017E+01                    *9213
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*9214   360          1          0.424170E+02                    *9215
*9215   361          1          0.491571E+03                    *9216
*9216   362          1          0.156462E+04                    *9217
*9217   363          1          -.188062E+05                    *9218
*9218   364          1          -.222663E+04                    *9219
*9219   367          1          0.511802E+00                    *9220
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*9222   370          1          0.254233E+03                    *9223
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*9225   373          1          0.303574E+03                    *9226
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DMIG    *VTAIL       383        1                               *9277
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DMIG    *VTAIL       385        1                               *9326
*9326   357          1          0.710800E+01                    *9327
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*9349   383          1          -.714582E-02                    *9350
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*9429   382          1                -.303660E+04                *9430
*9430   383          1                -.859051E+03                *9431
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*9432   385          1                -.106061E+03                *9433
*9433   386          1                0.590076E+03                *9434
*9434   387          1                -.160275E+04                *9435
*9435   388          1                0.483130E+05
DMIG    *VTAIL       389              1                           *9436
*9436   357          1                0.103213E+02                *9437
*9437   358          1                0.166475E+01                *9438
*9438   359          1                -.573260E+01                *9439
*9439   360          1                -.121702E+01                *9440
*9440   361          1                -.236861E+00                *9441
*9441   362          1                0.275941E-01                *9442
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*9445   368          1                -.269597E+01                *9446
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*9466   384          1                0.243494E+04                *9467
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*9468   386          1                0.137165E+04                *9469
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DMIG    *VTAIL       391              1                           *9471
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*9475   390          1                -.160803E+04                *9476
*9476   391          1                0.320895E+04
DMIG    *VTAIL       392              1                           *9477
*9477   386          1                0.123460E+04                *9478
*9478   387          1                -.183606E+04                *9479
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+EIG1   MAX
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GRID    2       5       -131.7509.602   .000    0
GRID    3       5       -100.75011.331  .000    0
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GRID    10      5       -100.7503.353   .000    0
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MAT1    5       10.5E6  4.400E6
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+8A     0.      1.

PBEAM   9       2       1980.0009400.0003900.000        5250.           +9
+9      NO      1.0             9400.0003887.062                        +9A
+9A     0.      1.
PBEAM   10      2       1980.0009400.0003887.062        5250.           +10
+10     NO      1.0             10100.003670.000                        +10A
+10A    0.      1.
PBEAM   11      2       1980.00010100.003670.000        5250.           +11
+11     NO      1.0             1000.0003691.000                        +11A
+11A    0.      1.
PBEAM   12      2       1980.0001000.0003691.000        5250.           +12
+12     NO      1.0             9600.0003700.000                        +12A
+12A    0.      1.
PBEAM   13      2       1980.0009600.0003700.000        5250.           +13
+13     NO      1.0             8750.0003780.000                        +13A
+13A    0.      1.
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+14     NO      1.0             8123.6303590.000                        +14A
+14A    0.      1.
PBEAM   15      2       1980.0008123.6303590.000        5250.           +15
+15     NO      1.0             7200.0003340.000                        +15A
+15A    0.      1.
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+16     NO      1.0             6425.0001872.000                        +16A
+16A    0.      1.
PBEAM   17      2       1980.0006425.0  1872.00         4910.0          +17
+17     NO      1.0     1980.0006375.0  1791.00                         +17A
+17A    0.      1.              .0000
PBEAM   18      2       1980.0006375.0  1791.00         4725.0          +18
+18     NO      1.0     1980.0006200.0  1470.00                         +18A
+18A    0.      1.              .0000
PBEAM   19      2       1980.0006200.0  1470.00         4515.0          +19
+19     NO      1.0     1980.0006900.0  1374.00                         +19A
+19A    0.      1.              .0000
PBEAM   20      2       1980.0006900.0  1374.00         4375.5          +20
+20     NO      1.0     1980.0008250.0  1167.00                         +20A
+20A    0.      1.              .0000
PBEAM   21      2       1980.0008250.0  1167.00         4147.5          +21
+21     NO      1.0     1980.0008250.0  960.00                          +21A
+21A    0.      1.              .0000
PBEAM   22      2       1.      8250.000960.00          3885.           +22
+22     NO      1.0             8250.000                                +22A
+22A    0.      0.
PBEAM   31      2       200.000 9999.0  99999.00        .01             +31
+31     NO      1.0     197.000
PBEAM   32      2       200.000 9999.0  99999.00        .01             +32
+32     NO      1.0     200.000
PBEAM   33      2       200.000 9999.0  99999.00        .01             +33
+33     NO      1.0     207.000
PBEAM   34      2       200.000 9999.0  99999.00        .01             +34
+34     NO      1.0     215.000
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+35     NO      1.0     219.000
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+36     NO      1.0     222.000
PBEAM   37      2       1980.0009999.0  9999.00         .01             +37
+37     NO      1.0     1188.000
PBEAM   38      2       1.970   9999.0  251.45          .01             +38
+38     NO      1.0     .950            49.35
PBEAM   39      2       4.140   9999.0  323.80                          +39
+39     NO      1.0     2.140           123.20
PBEAM   40      2       4.140   9999.0  284.10                          +40
+40     NO      1.0     2.180           140.90
PBEAM   41      2       5.590   9999.0  376.40                          +41
+41     NO      1.0     2.834           124.70
PBEAM   42      2       3.942   9999.0  379.30                          +42
+42     NO      1.0     2.088           112.40
PBEAM   43      2       2.886   9999.0  350.15                          +43
+43     NO      1.0     2.340           293.75
PBEAM   44      2       2.340   9999.0  293.75                          +44
+44     NO      1.0     1.430           99.875
PBEAM   45      2       1.430   9999.0  99.875          .001            +45
+45     NO      1.0     1.521           76.375
PBEAM   46      2       2.250   9999.0  215.00          .001            +46
+46     NO      1.0     2.250           162.00
PBEAM   47      2       2.250   9999.0  162.00                          +47
+47     NO      1.0     1.875           133.00
PBEAM   48      2       1.875   9999.0  133.00                          +48
+48     NO      1.0     2.250           46.00
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+49     NO      1.0     1.354           51.57                           +49A
+49A    0.      1.              -.1188
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+50     NO      1.0     1.371           53.59                           +50A
+50A    0.      1.              -.0185
PBEAM   51      2       1.371   1.      53.59                           +51
+51     NO      1.0     1.371           53.59                           +51A
+51A    0.      1.              .0000
PBEAM   52      2       1.371   1.      53.59                           +52
+52     NO      1.0     1.534           60.14                           +52A
+52A    0.      1.              -.0622
PBEAM   53      2       1.534   1.      60.14           .001            +53
+53     NO      1.0     1.547           62.03                           +53A
+53A    0.      1.              -.0086
PBEAM   54      2       .942    1.      37.54           .001            +54
+54     NO      1.0     1.449           76.22                           +54A
+54A    0.      1.              -.4242
PBEAM   55      2       1089.0001.      9999.00         .001            +55
+55     NO      1.0     1980.000        9999.00                         +55A
+55A    0.      1.              .0000
PBEAM   56      2       1980.0001.      9999.00         .001            +56
+56     NO      1.0     1485.000        9999.00                         +56A
+56A    0.      1.              .0000
PBEAM   57      2       1.440   .001    .001            .001            +57
+57     NO      1.0     1.440                                           +57A
+57A    0.      1.              .0000
PBEAM   141     2       2.380   1.      46.34           .001            +141
+141    NO      1.0     2.520           52.89                           +141A
+141A   0.      1.              -.0571
PBEAM   142     2       2.520   1.      52.89           .001            +142
+142    NO      1.0     2.660           60.54                           +142A
+142A   0.      1.              -.0541
PBEAM   143     2       2.660   1.      54.50           .001            +143
+143    NO      1.0     2.800           61.49                           +143A
+143A   0.      1.              -.0513
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PBEAM   144     2       2.800   1.      61.49           .001    +144
+144    NO      1.0     3.080           76.54                   +144A
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PBEAM   145     2       3.080   1.      76.54           .001    +145
+145    NO      1.0     3.080           76.54                   +145A
+145A   0.      1.              .0000
PBEAM   146     2       .990    1.      44.68           .001    +146
+146    NO      1.0     1.017           47.44                   +146A
+146A   0.      1.              -.0269
PBEAM   147     2       1.017   1.      34.25           .001    +147
+147    NO      1.0     1.620           103.19                  +147A
+147A   0.      1.              -.4573
PBEAM   148     2       1.500   1.      24.08           .001    +148
+148    NO      1.0     1.875           39.37                   +148A
+148A   0.      1.              -.2222
PBEAM   149     2       1.875   1.      39.37           .001    +149
+149    NO      1.0     2.250           59.52                   +149A
+149A   0.      1.              -.1818
PBEAM   150     2       1.125   1.      44.13           .001    +150
+150    NO      1.0     1.538           87.37                   +150A
+150A   0.      1.              -.3099
PBEAM   151     2       1.538   1.      86.52           .001    +151
+151    NO      1.0     1.750           115.17                  +151A
+151A   0.      1.              -.1293
PBEAM   152     2       1.750   1.      115.17          .001    +152
+152    NO      1.0     1.750           115.17                  +152A
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PBEAM   153     2       14.000  1.      129.80          .001    +153
+153    NO      1.0     14.000          129.80                  +153A
+153A   0.      1.              .0000
PBEAM   154     2       14.000  1.      79.18           .001    +154
+154    NO      1.0     18.000          130.90                  +154A
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PBEAM   160     2       30.000  .001    .001            .001    +160
+160    NO      1.0     30.000                                  +160A
+160A   0.      1.              .0000
PBEAM   161     2       1980.0001.      9999.00         .001    +161
+161    NO      1.0     2970.000        9999.00                 +161A
+161A   0.      1.              .0000
PBEAM   162     2       2970.0001.      9999.00         .001    +162
+162    NO      1.0     1782.000        47.10                   +162A
+162A   0.      1.              .0000
PBEAM   163     2       1.080   1.      121.33          .001    +163
+163    NO      1.0     1.080           99.73                   +163A
+163A   0.      1.              .0000
PBEAM   164     2       1980.0001.      9999.00         .001    +164
+164    NO      1.0     2970.000        9999.00                 +164A
+164A   0.      1.              .0000
PBEAM   165     2       2970.0001.      9999.00         .001    +165
+165    NO      1.0     1980.000        9999.00                 +165A
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PBEAM   166     2       .840    1.      181.16          .001    +166
+166    NO      1.0     .678            115.24                  +166A
+166A   0.      1.              .2134
PBEAM   167     2       1980.0001.      9999.00         .001    +167
+167    NO      1.0     1980.000        9999.00                 +167A
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PBEAM   168     2       1.400   1.      239.03          .001    +168
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+168A   0.      1.              .2400
PBEAM   169     2       4.200   1.      20.00           .001    +169
+169    NO      1.0     3.210           20.00                   +169A
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PBEAM   172     2       1.230   1.      84.87           .001    +172
+172    NO      1.0     1.000           57.12                   +172A
+172A   0.      1.              .2063
PBEAM   173     2       1.125   1.      41.92           .001    +173
+173    NO      1.0     1.188           46.53                   +173A
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PBEAM   174     2       .750    1.      12.63           .001    +174
+174    NO      1.0     1.063           23.78                   +174A
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PBEAM   175     2       1059.3001.      9999.00         .001    +175
+175    NO      1.0     841.500         9999.00                 +175A
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PBEAM   176     2       75.000  1.      2.98            .001    +176
+176    NO      1.0     79.000          12.10                   +176A
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PBEAM   177     2       79.000  1.      12.10           .001    +177
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+179    NO      1.0     90.000
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+180    NO      1.0     55.800          31.90
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+181    NO      1.0
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+182    NO      1.0
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+1002   NO      1.      1.23648         13.640                  +1002A
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+1003   NO      1.      1.09137         12.836                  +1003A
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+1009   NO      1.      0.05704                                 +1009A
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+1011   NO      1.      0.58224         3.781                   +1011A
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+1012   NO      1.      0.3817          3.085                   +1012A
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+1013   NO      1.      0.2527          3.779                   +1013A
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+1015   NO      1.      1.26225         36.787                  +1015A
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+1016A  0.      1.              .118
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PBEAM   1022    2       .004037 1.      8.0                     +1022
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+1023   NO      1.      .173225         1.931                   +1023A
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+1024   NO      1.      .137473         .991                    +1024A
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PBEAM   1038    2       0.54612 1.      5.551                   +1038
+1038   NO      1.      0.58212         5.807                   +1038A
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+1074A  0.    1.                .105
PBEAM   1075  2     .675834  1.      32.711                   +1075
+1075   NO    1.    .608902          25.555                   +1075A
+1075A  0.    1.                .104
PBEAM   1076  2     .74152   1.      3.66                     +1076
+1076   NO    1.    .64649           10.312                   +1076A
+1076A  0.    1.                .137
PBEAM   1077  2     0.59676  1.      12.691                   +1077
+1077   NO    1.    0.50976          2.256                    +1077A
+1077A  0.    1.                .157
PBEAM   1078  2     .531     1.      6.135                    +1078
+1078   NO    1.    .504625          5.541                    +1078A
+1078A  0.    1.                5.09-2
PBEAM   1079  2     0.52481  1.      5.541                    +1079
+1079   NO    1.    0.49517          4.933                    +1079A
+1079A  0.    1.                5.81-2
PBEAM   1080  2     0.41899  1.      4.933                    +1080
+1080   NO    1.    0.36586          6.161                    +1080A
+1080A  0.    1.                .135
PBEAM   1081  2     .902630  1.      30.774                   +1081
+1081   NO    1.    .842997          31.687                   +1081A
+1081A  0.    1.                6.83-2
PBEAM   1082  2     .756112  1.      9.525                    +1082
+1082   NO    1.    .694238          19.190                   +1082A
+1082A  0.    1.                8.53-2
PBEAM   1083  2     0.90882  1.      14.949                   +1083
+1083   NO    1.    0.84618          2.210                    +1083A
+1083A  0.    1.                7.14-2
PBEAM   1084  2     0.9402   1.      2.762                    +1084
+1084   NO    1.    0.8128           2.065                    +1084A
+1084A  0.    1.                .145
PBEAM   1085  2     0.48768  1.      2.242                    +1085
+1085   NO    1.    0.39912          2.251                    +1085A
+1085A  0.    1.                .200
PBEAM   1086  2     0.73172  1.      4.425                    +1086
+1086   NO    1.    0.7194           4.277                    +1086A
+1086A  0.    1.                1.70-2
PBEAM   1087  2     0.7194   1.      4.277                    +1087
+1087   NO    1.    0.66748          3.682                    +1087A
+1087A  0.    1.                7.49-2
PBEAM   1088  2     0.48544  1.      3.682                    +1088
+1088   NO    1.    0.448            3.136                    +1088A
+1088A  0.    1.                8.02-2
PBEAM   1089  2     0.616    1.      3.136                    +1089
+1089   NO    1.    0.59752          2.951                    +1089A
+1089A  0.    1.                3.05-2
PBEAM   1090  2     0.59752  1.      3.319                    +1090
+1090   NO    1.    0.56496          2.968                    +1090A
+1090A  0.    1.                5.60-2
PBEAM   1091  2     .964044  1.      26.163                   +1091
+1091   NO    1.    .900046          33.946                   +1091A
+1091A  0.    1.                6.87-2
PBEAM   1092  2     .80058   1.      8.240                    +1092
+1092   NO    1.    .740025          7.040                    +1092A
+1092A  0.    1.                7.86-2
PBEAM   1093  2     0.9867   1.      3.017                    +1093
+1093   NO    1.    0.9295           2.678                    +1093A
+1093A  0.    1.                5.97-2
PBEAM   1094  2     0.7605   1.      2.231                    +1094
+1094   NO    1.    0.70344          1.909                    +1094A
+1094A  0.    1.                7.80-2
PBEAM   1095  2     0.62528  1.      2.245                    +1095
+1095   NO    1.    0.56416          5.554                    +1095A
+1095A  0.    1.                .103
PBEAM   1096  2     1.12832  1.      3.720                    +1096
+1096   NO    1.    1.03488          3.138                    +1096A
+1096A  0.    1.                8.64-2
PBEAM   1097  2     0.58212  1.      .9936                    +1097
+1097   NO    1.    0.52038          .794                     +1097A
+1097A  0.    1.                .112
PBEAM   1098  2     0.46256  1.      .878                     +1098
+1098   NO    1.    0.41088          .692                     +1098A
+1098A  0.    1.                .118
PBEAM   1099  2     0.56496  1.      2.968                    +1099

+1099   NO    1.    0.50864          3.405                    +1099A
+1099A  0.    1.                .105
PBEAM   1100  2     0.32368  1.      2.951                    +1100
+1100   NO    1.    0.2702           1.360                    +1100A
+1100A  0.    1.                .180
PBEAM   1101  2     0.2895   1.      1.434                    +1101
+1101   NO    1.    0.237            1.561                    +1101A
+1101A  0.    1.                .199
PBEAM   1102  2     .803494  1.      19.105                   +1102
+1102   NO    1.    .756148          18.318                   +1102A
+1102A  0.    1.                6.07-2
PBEAM   1103  2     .868368  1.      3.7                      +1103
+1103   NO    1.    .808308          3.656                    +1103A
+1103A  0.    1.                7.16-2
PBEAM   1104  2     0.56848  1.      7.616                    +1104
+1104   NO    1.    0.53648          2.977                    +1104A
+1104A  0.    1.                5.79-2
PBEAM   1105  2     0.53648  1.      1.985                    +1105
+1105   NO    1.    0.49888          2.015                    +1105A
+1105A  0.    1.                7.26-2
PBEAM   1106  2     0.49888  1.      2.217                    +1106
+1106   NO    1.    0.4536           2.014                    +1106A
+1106A  0.    1.                9.51-2
PBEAM   1107  2     0.70875  1.      2.009                    +1107
+1107   NO    1.    0.664            1.764                    +1107A
+1107A  0.    1.                6.52-2
PBEAM   1108  2     0.3984   1.      .670                     +1108
+1108   NO    1.    0.37695          .600                     +1108A
+1108A  0.    1.                5.53-2
PBEAM   1109  2     0.37695  1.      .600                     +1109
+1109   NO    1.    0.3324           1.367                    +1109A
+1109A  0.    1.                .126
PBEAM   1110  2     0.35456  1.      1.367                    +1110
+1110   NO    1.    0.31472          .368                     +1110A
+1110A  0.    1.                .119
PBEAM   1111  2     0.15736  1.      .242                     +1111
+1111   NO    1.    0.1264           1.156                    +1111A
+1111A  0.    1.                .218
PBEAM   1112  2     0.1728   1.      .303                     +1112
+1112   NO    1.    0.16064          .262                     +1112A
+1112A  0.    1.                7.29-2
PBEAM   1113  2     0.16064  1.      .222                     +1113
+1113   NO    1.    0.13784          .163                     +1113A
+1113A  0.    1.                .153
PBEAM   1114  2     0.13784  1.      .148                     +1114
+1114   NO    1.    0.12232          .117                     +1114A
+1114A  0.    1.                .119
PBEAM   1115  2     0.12232  1.      .117                     +1115
+1115   NO    1.    0.108            .991                     +1115A
+1115A  0.    1.                .124
PBEAM   1116  2     .337714  1.      19.909                   +1116
+1116   NO    1.    .312716          19.868                   +1116A
+1116A  0.    1.                7.69-2
PBEAM   1117  2     0.85918  1.      3.590                    +1117
+1117   NO    1.    0.77384          3.626                    +1117A
+1117A  0.    1.                .105
PBEAM   1118  2     0.54624  1.      6.20                     +1118
+1118   NO    1.    0.49872          2.937                    +1118A
+1118A  0.    1.                9.10-2
PBEAM   1119  2     0.39482  1.      1.371                    +1119
+1119   NO    1.    0.35112          1.197                    +1119A
+1119A  0.    1.                .117
PBEAM   1120  2     0.31416  1.      1.796                    +1120
+1120   NO    1.    0.27047          1.622                    +1120A
+1120A  0.    1.                .149
PBEAM   1121  2     0.36593  1.      .570                     +1121
+1121   NO    1.    0.32453          .448                     +1121A
+1121A  0.    1.                .120
PBEAM   1122  2     0.23987  1.      .388                     +1122
+1122   NO    1.    0.2193           .324                     +1122A
+1122A  0.    1.                8.96-2
PBEAM   1123  2     2.193    1.      0.577                    +1123
+1123   NO    1.    1.7255           0.319                    +1123A
+1123A  0.    1.                .239
PBEAM   1124  2     1.7255   .1      0.319                    +1124
+1124   NO    1.    1.411            0.186                    +1124A
+1124A  0.    1.                .201
PBEAM   1125  2     1.411    1.      0.186                    +1125
+1125   NO    1.    1.122            0.37                     +1125A
+1125A  0.    1.                .228
PBEAM   1126  2     0.290    1.      .15                      +1126
+1126   NO    1.    0.230                                     +1126A
+1126A  0.    1.                .231
PBEAM   1127  2     0.230    1.      .15                      +1127
+1127   NO    1.    0.180                                     +1127A
+1127A  0.    1.                .244
PBEAM   1128  2     0.180    1.      .15                      +1128
+1128   NO    1.    0.150                                     +1128A
+1128A  0.    1.                .182
PBEAM   1131  2     24.900   1.      2.334                    +1131
+1131   NO    1.0   41.600           4.497                    +1131A
+1131A  0.    1.                -.502
PBEAM   1132  2     22.300   1.      1.258                    +1132
+1132   NO    1.0   43.800           6.091                    +1132A
+1132A  0.    1.                -.651
PBEAM   1133  2     43.800   1.      6.091            .001    +1133
+1133   NO    1.0   46.400           8.843                    +1133A
+1133A  0.    1.                -.058
PBEAM   1134  2     46.4     100.    13.5             10.     +1134
+1134   NO    1.    50.68                                     +1134A
+1134A  0.    1.                -8.82-2
PBEAM   1135  2     20.300   1.      1.601                    +1135
+1135   NO    1.0   39.600           5.214                    +1135A
+1135A  0.    1.                -.644
PBEAM   1136  2     17.900   1.      1.469                    +1136
+1136   NO    1.0   35.300           4.849                    +1136A
+1136A  0.    1.                -.654
PBEAM   1137  2     35.300   1.      4.849            .001    +1137
+1137   NO    1.0   39.910           7.360                    +1137A
+1137A  0.    1.                -.123
PBEAM   1138  2     39.91    100.    10.5             10.     +1138
+1138   NO    1.    40.37                                     +1138A
+1138A  0.    1.                -1.15-2
PBEAM   1139  2     15.900   1.      1.286                    +1139
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+1139   NO    1.0    31.800          4.283                          +1139A
+1139A  0.    1.                  -.667
PBEAM   1140  2      14.000  1.      .836                           +1140
+1140   NO    1.0    28.200          2.827                          +1140A
+1140A  0.    1.                  -.673
PBEAM   1141  2      28.200  1.      2.827          .001            +1141
+1141   NO    1.0    32.160          4.634                          +1141A
+1141A  0.    1.                  -.131
PBEAM   1142  2      32.16   100.    7.94           10.             +1142
+1142   NO    1.     32.70                                          +1142A
+1142A  0.    1.                  -1.67-2
PBEAM   1143  2      12.800  1.      .537                           +1143
+1143   NO    1.0    26.050          1.860                          +1143A
+1143A  0.    1.                  -.682
PBEAM   1144  2      11.190  1.      .541                           +1144
+1144   NO    1.0    23.000          1.894                          +1144A
+1144A  0.    1.                  -.691
PBEAM   1145  2      23.000  1.      1.894          .001            +1145
+1145   NO    1.0    25.560          3.414                          +1145A
+1145A  0.    1.                  -.105
PBEAM   1146  2      25.56   100.    6.5            10.             +1146
+1146   NO    1.     27.16                                          +1146A
+1146A  0.    1.                  -6.070-2
PBEAM   1147  2      9.060   1.      .492                           +1147
+1147   NO    1.0    19.800          1.700                          +1147A
+1147A  0.    1.                  -.744
PBEAM   1148  2      7.640   1.      .210                           +1148
+1148   NO    1.0    17.500          .929                           +1148A
+1148A  0.    1.                  -.784
PBEAM   1149  2      17.500  1.      .929           .001            +1149
+1149   NO    1.0    18.620          1.942                          +1149A
+1149A  0.    1.                  -.062
PBEAM   1150  2      18.62   100.    4.32           10.             +1150
+1150   NO    1.     19.3                                           +1150A
+1150A  0.    1.                  -3.59-2
PBEAM   1151  2      7.100   1.      .042                           +1151
+1151   NO    1.0    16.900          .269                           +1151A
+1151A  0.    1.                  -.817
PBEAM   1152  2      22.300  1.      1.150                          +1152
+1152   NO    1.0    24.900          1.440                          +1152A
+1152A  0.    1.                  -.110
PBEAM   1153  2      20.300  1.      .870                           +1153
+1153   NO    1.0    22.300          1.150                          +1153A
+1153A  0.    1.                  -.094
PBEAM   1154  2      17.900  1.      .630                           +1154
+1154   NO    1.0    20.300          .870                           +1154A
+1154A  0.    1.                  -.126
PBEAM   1155  2      15.900  1.      .470                           +1155
+1155   NO    1.0    17.900          .630                           +1155A
+1155A  0.    1.                  -.118
PBEAM   1156  2      14.000  1.      .340                           +1156
+1156   NO    1.0    15.900          .470                           +1156A
+1156A  0.    1.                  -.127
PBEAM   1157  2      12.800  1.      .260                           +1157
+1157   NO    1.0    14.000          .340                           +1157A
+1157A  0.    1.                  -.090
PBEAM   1158  2      11.190  1.      .280                           +1158
+1158   NO    1.0    12.800          .260                           +1158A
+1158A  0.    1.                  -.134
PBEAM   1159  2      9.060   1.      .260                           +1159
+1159   NO    1.0    11.190          .280                           +1159A
+1159A  0.    1.                  -.210
PBEAM   1160  2      7.640   1.      .170                           +1160
+1160   NO    1.0    9.060           .260                           +1160A
+1160A  0.    1.                  -.170
PBEAM   1161  2      7.100   1.      .120                           +1161
+1161   NO    1.0    7.640           .170                           +1161A
+1161A  0.    1.                  -.073
PBEAM   1162  2      43.800  1.      5.189                          +1162
+1162   NO    1.0    41.600          5.636                          +1162A
+1162A  0.    1.          .052
PBEAM   1163  2      39.600  1.      4.049                          +1163
+1163   NO    1.0    43.800          5.170                          +1163A
+1163A  0.    1.                  -.101
PBEAM   1164  2      35.300  1.      3.053                          +1164
+1164   NO    1.0    39.600          4.049                          +1164A
+1164A  0.    1.                  -.115
PBEAM   1165  2      31.800  1.      2.364                          +1165
+1165   NO    1.0    35.300          3.040                          +1165A
+1165A  0.    1.                  -.104
PBEAM   1166  2      28.200  1.      1.762                          +1166
+1166   NO    1.0    31.800          2.354                          +1166A
+1166A  0.    1.                  -.120
PBEAM   1167  2      26.050  1.      1.444                          +1167
+1167   NO    1.0    28.200          1.754                          +1167A
+1167A  0.    1.                  -.079
PBEAM   1168  2      23.000  1.      1.274                          +1168
+1168   NO    1.0    26.050          1.431                          +1168A
+1168A  0.    1.                  -.124
PBEAM   1169  2      19.800  1.      1.019                          +1169
+1169   NO    1.0    23.000          1.269                          +1169A
+1169A  0.    1.                  -.150
PBEAM   1170  2      17.500  1.      .706                           +1170
+1170   NO    1.0    19.800          1.007                          +1170A
+1170A  0.    1.                  -.123
PBEAM   1171  2      16.900  1.      .588                           +1171
+1171   NO    1.0    17.500          .709                           +1171A
+1171A  0.    1.                  -.035
PBEAM   1181  2      0.341   100.    4.328          .001            +1181
+1181   NO    1.     1.0025          10.953                         +1181A
+1181A  0.    1.                  -.984
PBEAM   1182  2      1.604   1.      75.00000       .265            +1182
+1182   NO    1.0    1.365           70.00000                       +1182A
+1182A  0.    1.          .1611
PBEAM   1183  2      68.240  1.      70.00000       .265            +1183
+1183   NO    1.0    53.180          18.30000                       +1183A
+1183A  0.    1.          .2481
PBEAM   1184  2      1.064   1.      18.30000       .265            +1184
+1184   NO    1.0    .715            5.30000                        +1184A
+1184A  0.    1.          .3923
PBEAM   1185  2      .715    1.      5.30000        .265            +1185
+1185   NO    1.0    .370            .65000                         +1185A
+1185A  0.    1.          .6362
PBEAM   1186  2      22.130  1.      7.00000        .265            +1186
+1186   NO    1.0    21.000          7.00000                        +1186A
+1186A  0.    1.          .0524
PBEAM   1187  2      21.000  1.      7.00000        .265            +1187
+1187   NO    1.0    16.200          .95000                         +1187A
+1187A  0.    1.          .2581
PBEAM   1188  2      16.200  1.      .95000         .265            +1188
+1188   NO    1.0    10.900          .30000                         +1188A
+1188A  0.    1.          .3911
PBEAM   1189  2      10.900  1.      .30000         .265            +1189
+1189   NO    1.0    5.690           .04000                         +1189A
+1189A  0.    1.          .6281
PBEAM   1190  2      3.414   100.    1.1            .001            +1190
+1190   NO    1.     2.802           1.0                            +1190A
+1190A  0.    1.          .197
PBEAM   1191  2      18.680  1.      5.80000        .265            +1191
+1191   NO    1.0    18.680          5.80000                        +1191A
+1191A  0.    1.          .0000
PBEAM   1192  2      18.680  1.      5.80000        .265            +1192
+1192   NO    1.0    14.740          .28300                         +1192A
+1192A  0.    1.          .2358
PBEAM   1193  2      14.740  1.      .28300         .265            +1193
+1193   NO    1.0    9.990           .09600                         +1193A
+1193A  0.    1.          .3841
PBEAM   1194  2      9.990   1.      .09600         .265            +1194
+1194   NO    1.0    5.250           .01400                         +1194A
+1194A  0.    1.          .6220
PBEAM   1195  2      35.960  1.      5.14100        .265            +1195
+1195   NO    1.0    33.740          5.13000                        +1195A
+1195A  0.    1.          .0637
PBEAM   1196  2      33.740  1.      5.13000        .265            +1196
+1196   NO    1.0    26.740          .22400                         +1196A
+1196A  0.    1.          .2315
PBEAM   1197  2      26.740  1.      .22400         .265            +1197
+1197   NO    1.0    18.100          .07510                         +1197A
+1197A  0.    1.          .3854
PBEAM   1198  2      18.100  1.      .07510         .265            +1198
+1198   NO    1.0    9.500           .01143                         +1198A
+1198A  0.    1.          .6232
PBEAM   1199  2      0.924   100.    0.32           .001            +1199
+1199   NO    1.     0.7535          0.25                           +1199A
+1199A  0.    1.          .203
PBEAM   1200  2      15.070  1.      3.20000        .265            +1200
+1200   NO    1.0    15.070          3.20000                        +1200A
+1200A  0.    1.          .0000
PBEAM   1201  2      15.070  1.      3.20000        .265            +1201
+1201   NO    1.0    13.370          .17300                         +1201A
+1201A  0.    1.          .1195
PBEAM   1202  2      13.370  1.      .17300         .265            +1202
+1202   NO    1.0    8.120           .05600                         +1202A
+1202A  0.    1.          .4886
PBEAM   1203  2      8.120   1.      .05600         .265            +1203
+1203   NO    1.0    4.260           .00880                         +1203A
+1203A  0.    1.          .6236
PBEAM   1204  2      15.940  1.      2.00000        .265            +1204
+1204   NO    1.0    13.940          2.00000                        +1204A
+1204A  0.    1.          .1339
PBEAM   1205  2      13.940  1.      2.00000        .265            +1205
+1205   NO    1.0    11.130          .10800                         +1205A
+1205A  0.    1.          .2242
PBEAM   1206  2      11.130  1.      .10800         .265            +1206
+1206   NO    1.0    7.530           .03700                         +1206A
+1206A  0.    1.          .3859
PBEAM   1207  2      7.530   1.      .03700         .265            +1207
+1207   NO    1.0    3.950           .00580                         +1207A
+1207A  0.    1.          .6237
PBEAM   1208  2      12.820  1.      1.20000        .265            +1208
+1208   NO    1.0    12.820          1.20000                        +1208A
+1208A  0.    1.          .0000
PBEAM   1209  2      12.820  1.      1.20000        .265            +1209
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+1212A  0.    1.          .113
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+1213A  0.    1.          .0749
PBEAM   1214  2      11.690  1.      .70000         .265            +1214
+1214   NO    1.0    9.420           .05530                         +1214A
+1214A  0.    1.          .2151
PBEAM   1215  2      9.420   1.      .05530         .265            +1215
+1215   NO    1.0    6.360           .01900                         +1215A
+1215A  0.    1.          .3878
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+1216   NO    1.0    3.330           .00290                         +1216A
+1216A  0.    1.          .6254
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+1217   NO    1.0    10.620          .40000                         +1217A
+1217A  0.    1.          .0708
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+1218A  0.    1.          .2137
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+1219   NO    1.0    5.750           .00760                         +1219A
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+1220   NO    1.0    2.990           .00130                         +1220A
+1220A  0.    1.          .6316
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+1231   NO    1.0    .614            25.02095                       +1231A
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+1232   NO    1.0    .315            2.20872                        +1232A
+1232A  0.    1.                  -.1169
PBEAM   1233  2      .152    1.      1.15839        .900            +1233
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+1242   NO      1.0     16.200          .01850                          +1242A
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PBEAM   1253    2       9.050   1.      .00315          .900            +1253
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RBAR    223     292     1292    123456          123
RBAR    224     292     2292    123456          123
RBAR    225     293     1293    123456          123
RBAR    226     293     2293    123456          123
RBAR    227     464     1464    123456          123
RBAR    228     464     2464    123456          123
RBAR    229     465     1465    123456          123
RBAR    230     465     2465    123456          123
RBAR    231     466     1466    123456          123
RBAR    232     466     2466    123456          123
RBAR    233     467     1467    123456          123
RBAR    234     467     2467    123456          123
RBAR    235     293     294     123456          123
RBAR    236     290     291     123456          123
RBAR    237     276     277     123456          123
RBAR    238     298     195     123456          12456
RBAR    239     284     196     123456          12456
RBAR    1311    19      1019    123456          123
RBAR    1312    19      2019    123456          123
RBAR    1313    20      1020    123456          123
RBAR    1314    20      2020    123456          123
RBAR    1315    21      1021    123456          123
RBAR    1316    21      2021    123456          123
RBAR    1317    22      1022    123456          123
RBAR    1318    22      2022    123456          123
RBAR    1319    23      1023    123456          123
RBAR    1320    23      2023    123456          123
RBAR    1321    24      1024    123456          123
RBAR    1322    24      2024    123456          123
RBAR    1323    25      1025    123456          123
RBAR    1324    25      2025    123456          123
RBAR    1325    26      1026    123456          123
RBAR    1326    26      2026    123456          123
RBAR    1327    27      1027    123456          123
RBAR    1328    27      2027    123456          123
RBAR    1329    29      1029    123456          123
RBAR    1330    29      2029    123456          123
RBAR    1331    30      1030    123456          123
RBAR    1332    30      2030    123456          123
RBAR    1333    32      1032    123456          123
RBAR    1334    32      2032    123456          123
RBAR    1335    33      1033    123456          123
RBAR    1336    33      2033    123456          123
RBAR    1337    38      1038    123456          123
RBAR    1338    38      2038    123456          123
RBAR    1339    39      1039    123456          123
RBAR    1340    39      2039    123456          123
RBAR    1341    44      1044    123456          123
RBAR    1342    44      2044    123456          123
RBAR    1343    46      1046    123456          123
RBAR    1344    46      2046    123456          123
RBAR    1345    47      1047    123456          123
RBAR    1346    47      2047    123456          123
RBAR    1347    51      1051    123456          123
RBAR    1348    51      2051    123456          123
RBAR    1349    52      1052    123456          123
RBAR    1350    52      2052    123456          123
RBAR    1351    53      1053    123456          123
RBAR    1352    53      2053    123456          123
RBAR    1353    55      1055    123456          123
RBAR    1354    55      2055    123456          123
RBAR    1355    56      1056    123456          123
RBAR    1356    56      2056    123456          123
RBAR    1357    60      1060    123456          123
RBAR    1358    60      2060    123456          123
RBAR    1359    61      1061    123456          123
RBAR    1360    61      2061    123456          123
RBAR    1361    62      1062    123456          123
RBAR    1362    62      2062    123456          123
RBAR    1363    63      1063    123456          123
RBAR    1364    63      2063    123456          123
RBAR    1365    64      1064    123456          123
RBAR    1366    64      2064    123456          123
RBAR    1367    65      1065    123456          123
RBAR    1368    65      2065    123456          123
RBAR    1369    67      1067    123456          123
RBAR    1370    67      2067    123456          123
RBAR    1371    68      1068    123456          123
```

```
RBAR  1372  68  2068  123456  123
RBAR  1373  72  1072  123456  123
RBAR  1374  72  2072  123456  123
RBAR  1375  73  1073  123456  123
RBAR  1376  73  2073  123456  123
RBAR  1377  74  1074  123456  123
RBAR  1378  74  2074  123456  123
RBAR  1379  75  1075  123456  123
RBAR  1380  75  2075  123456  123
RBAR  1381  76  1076  123456  123
RBAR  1382  76  2076  123456  123
RBAR  1383  77  1077  123456  123
RBAR  1384  77  2077  123456  123
RBAR  1385  78  1078  123456  123
RBAR  1386  78  2078  123456  123
RBAR  1387  80  1080  123456  123
RBAR  1388  80  2080  123456  123
RBAR  1389  81  1081  123456  123
RBAR  1390  81  2081  123456  123
RBAR  1391  85  1085  123456  123
RBAR  1392  85  2085  123456  123
RBAR  1393  86  1086  123456  123
RBAR  1394  86  2086  123456  123
RBAR  1395  87  1087  123456  123
RBAR  1396  87  2087  123456  123
RBAR  1397  88  1088  123456  123
RBAR  1398  88  2088  123456  123
RBAR  1407  143  1143  123456  123
RBAR  1408  143  2143  123456  123
RBAR  1409  181  1181  123456  123
RBAR  1410  181  2181  123456  123
RBAR  1411  182  1182  123456  123
RBAR  1412  182  2182  123456  123
RBAR  1413  183  1183  123456  123
RBAR  1414  183  2183  123456  123
RBAR  1415  184  1184  123456  123
RBAR  1416  184  2184  123456  123
RBAR  1417  185  1185  123456  123
RBAR  1418  185  2185  123456  123
RBAR  1419  186  1186  123456  123
RBAR  1420  186  2186  123456  123
RBAR  1421  187  1187  123456  123
RBAR  1422  187  2187  123456  123
RBAR  1423  188  1188  123456  123
RBAR  1424  188  2188  123456  123
RBAR  1425  189  1189  123456  123
RBAR  1426  189  2189  123456  123
RBAR  1427  190  1190  123456  123
RBAR  1428  190  2190  123456  123
RBAR  1429  191  1191  123456  123
RBAR  1430  191  2191  123456  123
RBAR  1431  192  1192  123456  123
RBAR  1432  192  2192  123456  123
RBAR  1433  193  1193  123456  123
RBAR  1434  193  2193  123456  123
RBAR  1435  242  1242  123456  123
RBAR  1436  242  2242  123456  123
RBAR  1437  243  1243  123456  123
RBAR  1438  243  2243  123456  123
RBAR  1439  244  1244  123456  123
RBAR  1440  244  2244  123456  123
RBAR  1441  245  1245  123456  123
RBAR  1442  245  2245  123456  123
RBAR  1451  1  1001  123456  123
RBAR  1452  1  2001  123456  123
RBAR  1453  2  1002  123456  123
RBAR  1454  2  2002  123456  123
RBAR  1455  3  1003  123456  123
RBAR  1456  3  2003  123456  123
RBAR  1457  4  1004  123456  123
RBAR  1458  4  2004  123456  123
RBAR  1459  5  1005  123456  123
RBAR  1460  5  2005  123456  123
RBAR  1461  6  1006  123456  123
RBAR  1462  6  2006  123456  123
RBAR  1463  7  1007  123456  123
RBAR  1464  7  2007  123456  123
RBAR  1465  8  1008  123456  123
RBAR  1466  8  2008  123456  123
RBAR  1467  10  1010  123456  123
RBAR  1468  10  2010  123456  123
RBAR  1469  12  1012  123456  123
RBAR  1470  12  2012  123456  123
RBAR  1471  14  1014  123456  123
RBAR  1472  14  2014  123456  123
RBAR  1473  16  1016  123456  123
RBAR  1474  16  2016  123456  123
RBAR  1475  18  1018  123456  123
RBAR  1476  18  2018  123456  123
RBAR  1477  173  1173  123456  123
RBAR  1478  173  2173  123456  123
RBAR  1479  174  1174  123456  123
RBAR  1480  174  2174  123456  123
RBAR  1481  175  1175  123456  123
RBAR  1482  175  2175  123456  123
RBAR  1483  176  1176  123456  123
RBAR  1484  176  2176  123456  123
RBAR  1485  177  1177  123456  123
RBAR  1486  177  2177  123456  123
RBAR  1487  178  1178  123456  123
RBAR  1488  178  2178  123456  123
RBAR  1489  179  1179  123456  123
RBAR  1490  179  2179  123456  123
RBAR  1491  180  1180  123456  123
RBAR  1492  180  2180  123456  123
RBAR  1493  194  1194  123456  123
RBAR  1494  194  2194  123456  123
RBAR  1501  96  1096  123456  123
RBAR  1502  96  2096  123456  123
RBAR  1503  97  1097  123456  123
RBAR  1504  97  2097  123456  123
RBAR  1505  98  1098  123456  123
RBAR  1506  98  2098  123456  123
RBAR  1507  99  1099  123456  123
RBAR  1508  99  2099  123456  123
RBAR  1509  100  1100  123456  123
RBAR  1510  100  2100  123456  123
RBAR  1511  101  1101  123456  123
RBAR  1512  101  2101  123456  123
RBAR  1513  102  1102  123456  123
RBAR  1514  102  2102  123456  123
RBAR  1515  103  1103  123456  123
RBAR  1516  103  2103  123456  123
RBAR  1517  104  1104  123456  123
RBAR  1518  104  2104  123456  123
RBAR  1519  105  1105  123456  123
RBAR  1520  105  2105  123456  123
RBAR  1521  106  1106  123456  123
RBAR  1522  106  2106  123456  123
RBAR  1523  107  1107  123456  123
RBAR  1524  107  2107  123456  123
RBAR  1525  108  1108  123456  123
RBAR  1526  108  2108  123456  123
RBAR  1527  109  1109  123456  123
RBAR  1528  109  2109  123456  123
RBAR  1529  110  1110  123456  123
RBAR  1530  110  2110  123456  123
RBAR  1531  111  1111  123456  123
RBAR  1532  111  2111  123456  123
RBAR  1533  112  1112  123456  123
RBAR  1534  112  2112  123456  123
RBAR  1535  113  1113  123456  123
RBAR  1536  113  2113  123456  123
RBAR  1537  125  1125  123456  123
RBAR  1538  125  2125  123456  123
RBAR  1539  126  1126  123456  123
RBAR  1540  126  2126  123456  123
RBAR  1541  127  1127  123456  123
RBAR  1542  127  2127  123456  123
RBAR  1543  128  1128  123456  123
RBAR  1544  128  2128  123456  123
RBAR  1545  129  1129  123456  123
RBAR  1546  129  2129  123456  123
RBAR  1547  130  1130  123456  123
RBAR  1548  130  2130  123456  123
RBAR  1549  131  1131  123456  123
RBAR  1550  131  2131  123456  123
RBAR  1551  132  1132  123456  123
RBAR  1552  132  2132  123456  123
RBAR  1553  133  1133  123456  123
RBAR  1554  133  2133  123456  123
RBAR  1555  134  1134  123456  123
RBAR  1556  134  2134  123456  123
RBAR  1557  135  1135  123456  123
RBAR  1558  135  2135  123456  123
RBAR  1559  136  1136  123456  123
RBAR  1560  136  2136  123456  123
RBAR  1561  137  1137  123456  123
RBAR  1562  137  2137  123456  123
RBAR  1563  138  1138  123456  123
RBAR  1564  138  2138  123456  123
RBAR  1565  139  1139  123456  123
RBAR  1566  139  2139  123456  123
RBAR  1567  140  1140  123456  123
RBAR  1568  140  2140  123456  123
RBAR  1569  141  1141  123456  123
RBAR  1570  141  2141  123456  123
RBAR  1571  142  1142  123456  123
RBAR  1572  142  2142  123456  123
RBAR  2235  501  1501  123456  123
RBAR  2236  501  2501  123456  123
RBAR  2237  502  1502  123456  123
RBAR  2238  502  2502  123456  123
RBAR  2239  503  1503  123456  123
RBAR  2240  503  2503  123456  123
RBAR  2241  504  1504  123456  123
RBAR  2242  504  2504  123456  123
RBAR  2243  505  1505  123456  123
RBAR  2244  505  2505  123456  123
RBAR  2245  506  1506  123456  123
RBAR  2246  506  2506  123456  123
RBAR  2247  507  1507  123456  123
RBAR  2248  507  2507  123456  123
RBAR  2249  508  1508  123456  123
RBAR  2250  508  2508  123456  123
RBAR  2251  509  1509  123456  123
RBAR  2252  509  2509  123456  123
RBAR  2253  510  1510  123456  123
RBAR  2254  510  2510  123456  123
RBAR  2255  511  1511  123456  123
RBAR  2256  511  2511  123456  123
RBAR  2257  512  1512  123456  123
RBAR  2258  512  2512  123456  123
RBAR  2259  513  1513  123456  123
RBAR  2260  513  2513  123456  123
RBAR  2261  514  1514  123456  123
RBAR  2262  514  2514  123456  123
RBAR  2263  515  1515  123456  123
RBAR  2264  515  2515  123456  123
RBAR  2265  516  1516  123456  123
RBAR  2266  516  2516  123456  123
RBAR  2267  517  1517  123456  123
RBAR  2268  517  2517  123456  123
RBAR  2269  518  1518  123456  123
RBAR  2270  518  2518  123456  123
RBAR  2271  519  1519  123456  123
RBAR  2272  519  2519  123456  123
RBAR  2273  520  1520  123456  123
RBAR  2274  520  2520  123456  123
RBAR  2275  521  1521  123456  123
RBAR  2276  521  2521  123456  123
RBAR  2277  522  1522  123456  123
RBAR  2278  522  2522  123456  123
RBAR  2279  523  1523  123456  123
RBAR  2280  523  2523  123456  123
RBAR  2281  524  1524  123456  123
RBAR  2282  524  2524  123456  123
RBAR  2283  525  1525  123456  123
```

```
RBAR    2284    525     2525    123456                  123
RBAR    2285    526     1526    123456                  123
RBAR    2286    526     2526    123456                  123
RBAR    3042    72      3016    123456
RBAR    3043    3016    143     123456                  123
SPC1    3       1       359     360     361     362     364     367
SPC1    3       1       368     369     370     371     373     381
SPC1    3       1       383     384     385     386     387     389
SPC1    3       1       390     391     392     393     408
SPC1    3       156     36      42      50      437     59      431
SPC1    3       156     71      84      298     286     117     285
SPC1    3       156     163     164     153     154     155     156
SPC1    3       156     267     268     458     459
SPC1    3       156     283     284     282     281     405
SPC1    4       234     36      42      50      437     59      431
SPC1    4       234     71      84      298     286     117     285
SPC1    4       234     163     164     153     154     155     156
SPC1    4       234     267     268     458     459
SPC1    4       234     283     284     282     281     405
SPC1    5       4       3022
SPC1    5       456     251     256     261     262     266
SPC1    5       456     1001    1002    1003    1004    1005    1006
SPC1    5       456     1007    1008    1010    1012    1014    1016
SPC1    5       456     1018    1173    1174    1175    1176    1177
SPC1    5       456     1019    THRU    1027
SPC1    5       456     1029    1030    1032    1033    1038    1039
SPC1    5       456     1031    1034    1037    1040    1045    1048
SPC1    5       456     1044    1046    1047    1051    1052    1053
SPC1    5       456     1054    1057    1066    1069    1079    1082
SPC1    5       456     1055    1056    1060    1061    1062    1063
SPC1    5       456     1064    1065    1067    1068    1072    1073
SPC1    5       456     1074    1075    1076    1077    1078    1080
SPC1    5       456     1079    1114    1275    1276    1280    1290
SPC1    5       456     1081    1085    1086    1087    1088
SPC1    5       456     1094    1114    1121
SPC1    5       456     1096    1097    1098    1099    1100    1101
SPC1    5       456     1102    1103    1104    1105    1106    1107
SPC1    5       456     1108    1109    1110    1111    1112    1113
SPC1    5       456     1125    1126    1127
SPC1    5       456     1128    1129    1130    1131    1132    1133
SPC1    5       456     1134    1135    1136    1137    1138    1139
SPC1    5       456     1140    1141    1142
SPC1    5       456     1143
SPC1    5       456     1178    1179    1180    1194
SPC1    5       456     1181    THRU    1193
SPC1    5       456     1233    2233
SPC1    5       456     1242    1243    1244    1245
SPC1    5       456     1251    THRU    1266
SPC1    5       456     1292    1293    1464    1465    1466    1467
SPC1    5       456     1501    THRU    1526
SPC1    5       456     2001    2002    2003    2004    2005    2006
SPC1    5       456     2007    2008    2010    2012    2014    2016
SPC1    5       456     2018    2173    2174    2175    2176    2177
SPC1    5       456     2019    THRU    2027
SPC1    5       456     2029    2030    2032    2033    2038    2039
SPC1    5       456     2031    2034    2037    2040    2045    2048
SPC1    5       456     2044    2046    2047    2051    2052    2053
SPC1    5       456     2054    2057    2066    2069    2079    2082
SPC1    5       456     2055    2056    2060    2061    2062    2063
SPC1    5       456     2064    2065    2067    2068    2072    2073
SPC1    5       456     2074    2075    2076    2077    2078    2080
SPC1    5       456     2079    2114    2275    2276    2280    2290
SPC1    5       456     2081    2085    2086    2087    2088
SPC1    5       456     2094    2114    2121
SPC1    5       456     2096    2097    2098    2099    2100    2101
SPC1    5       456     2102    2103    2104    2105    2106    2107
SPC1    5       456     2108    2109    2110    2111    2112    2113
SPC1    5       456     2125    2126    2127
SPC1    5       456     2128    2129    2130    2131    2132    2133
SPC1    5       456     2134    2135    2136    2137    2138    2139
SPC1    5       456     2140    2141    2142
SPC1    5       456     2143
SPC1    5       456     2178    2179    2180    2194
SPC1    5       456     2181    THRU    2193
SPC1    5       456     2242    2243    2244    2245
SPC1    5       456     2251    THRU    2266
SPC1    5       456     2292    2293    2464    2465    2466    2467
SPC1    5       456     2501    THRU    2526
SPC1    5       123456  701     702     703
SPCADD  1       3       5
SPCADD  2       4       5
SUPORT  42      156
ENDDATA
```

Appendix B.
Structural Finite Element Data for Typical LCO Case

```
ID LMTAS BLOCK 40 F-16 FLUTTER FEM TYPICAL LCO CASE
SOL 103
TIME 20
$
CEND
$
TITLE=F-16 1/2 AIRPLANE FINITE ELEMENT MODEL FOR FLUTTER ANALYSIS
SUBTI=ANTI-SYMMETRIC CENTERLINE BOUNDARY CONDITIONS // FULL XWING FUEL
LABEL=CONFIG 5 = MA41
DISP=ALL
ECHO=SORT
$ DMIG VERTICAL TAIL STIFFNESS MATRIX
K2GG=VTAIL
$ EIGENVALUE EXTRACTION
METHOD=1
$ SYMMETRIC B.C. / SPC=2 FOR ANTISYMMETRIC
SPC=2
$
$ SET 203022=GRIDS USED IN FLUTTER ANALYSIS.
$ ADD GRIDS 801 THROUGH 814 FOR DYNAMIC RESPONSE.
$
SET 203022=   2,   3,   4,   5,   6,
              9,  11,  13,  15,  17,
             19,  20,  21,  26,  29,
             33,  39,  44,  47,  51,
             52,  53,  56,  60,  61,
             62,  64,  65,  68,  72,
             73,  74,  75,  77,  78,
             81,  85,  86,  87,  89,
             90,  91,  92,  93,  95,
            102, 103, 104, 105, 106,
            107, 108, 109, 110, 111,
            112, 113, 122, 123, 124,
            128, 129, 130, 131, 132,
            133,3004,3006,3009        $ AIM-9/16S200 OR 16S200 ON TIP
$
$ GENERATE BUT DO NOT PRINT-
$  EIGENVECTORS FOR FLUTTER ANALYSIS
$
$ PRINT-
$ A-SET EIGENVECTORS FOR INSPECTION
$
OUTPUT(PLOT)
CSCALE=1.8
PAPER SIZE=26. BY 20.
$
$ SET 10=ELEMENTS USED IN MODE PLOTS
$
$ FUSELAGE CENTERLINE
SET 10=    1 THRU   26,
$ WING BOX
       1001 THRU 1005,
       1007,1010 THRU 1013,
       1020,1023 THRU 1025,
       1031,1034,1036,1043,1045,
       1046,1048 THRU 1054,
       1056 THRU 1062,
       1071 THRU 1074,
       1078,1079,1080,
       1086 THRU 1090,
       1099,1100,1101,
       1075,1076,1077,
       1081 THRU 1085,
       1091 THRU 1097,
       1102 THRU 1111,
       1116 THRU 1125,
       1126,1127,1128,
$ LEADING EDGE FLAP / 1258 ACTUATOR
       1131 THRU 1134,
       1136,1137,1138,
       1140,1141,1142,
       1144,1145,1146,
       1148 THRU 1151,
       1152 THRU 1171,
$ FLAPERON
       1181 THRU 1185,
       1187 THRU 1189,
       1190 THRU 1194,
       1196 THRU 1203,
       1205 THRU 1207,
       1209 THRU 1220,
       1231 THRU 1238,
       1251 THRU 1258,
       1261 THRU 1268,
$ HORIZONTAL TAIL
       2001 THRU 2058,
$ VERTICAL TAIL
       2401 THRU 2460,
$ 16S200 // STATION 1,9
       3003 THRU 3009,
$ AIM-9L // STATION 1,9
       3014,3015
$
MAXIMUM DEFORMATION 35.
AXES MX,MY,Z
VIEW 60.0,30.,0.
FIND SCALE ORIGIN 10 SET 10
PLOT MODAL DEFO 0 SET 10 ORIGIN 10
$
$
BEGIN BULK
ASET    3500    123456
ASET    3501    123456
```

```
ASET1   1       163     153     154     155     156     71      286
ASET1   1       267
ASET1   1       284     281
ASET1   1       367     408     368     359     384
ASET1   1       373     364     381     383
ASET1   1       386     391     371     362     387     392     393
ASET1   1       389     369     360     385     390     370     361
ASET1   1       410
ASET1   1       3050    3053    3057
ASET1   1       3207    3210    3211    3213
ASET1   2       3049    3054
ASET1   2       3206    3212
ASET1   3       6       17      5       15      4       13      3
ASET1   3       11      2       9
ASET1   3       19      72      20      60      73      21      61
ASET1   3       39      47      56      68      81
ASET1   3       74      51      62      75      26      52      64
ASET1   3       77      29      44      53      65      78      33
ASET1   3       85      86      87      88
ASET1   3       90      103     109     89      102     108
ASET1   3       95      107     113     93      106     112     124
ASET1   3       130     133     92      105     111     123     129
ASET1   3       132     91      104     110     122     128     131
ASET1   3       233
ASET1   3       251     THRU    266
ASET1   3       3017    3019    3022
ASET1   3       3046    3050    3053    3057
ASET1   3       3204    3210    3211    3213
ASET1   4       3204    3211
ASET1   5       153     154     155     156     71      286     284
ASET1   5       410
ASET1   5       459
ASET1   5       3211
ASET1   6       437     281     410
ASET1   6       458
ASET1   6       3207    3211
ASET1   3456    3018
ASET1   123456  3060
CBAR    27      27      284     410     1.      1.      0.
CBAR    2401    2401    407     367     0.      1.      1.
CBAR    2402    2402    367     368     0.      1.      1.
CBAR    2403    2403    368     369     0.      1.      1.
CBAR    2404    2404    369     370     0.      1.      1.
CBAR    2405    2405    370     371     0.      1.      1.
CBAR    2406    2406    371     372     0.      1.      1.
CBAR    2407    2407    372     373     0.      1.      1.
CBAR    2408    2408    357     358     0.      1.      1.
CBAR    2409    2409    358     359     0.      1.      1.
CBAR    2410    2410    359     360     0.      1.      1.
CBAR    2411    2411    360     361     0.      1.      1.
CBAR    2412    2412    361     362     0.      1.      1.
CBAR    2413    2413    362     363     0.      1.      1.
CBAR    2414    2414    363     364     0.      1.      1.
CBAR    2415    2415    409     375     0.      1.      1.
CBAR    2416    2416    375     376     0.      1.      1.
CBAR    2417    2417    376     377     0.      1.      1.
CBAR    2418    2418    377     378     0.      1.      1.
CBAR    2419    2419    378     379     0.      1.      1.
CBAR    2420    2420    379     380     0.      1.      1.
CBAR    2421    2421    380     381     0.      1.      1.
CBAR    2422    2422    382     383     0.      1.      1.
CBAR    2423    2423    384     385     0.      1.      1.
CBAR    2424    2424    385     386     0.      1.      1.
CBAR    2425    2425    386     387     0.      1.      1.
CBAR    2426    2426    387     388     0.      1.      1.
CBAR    2427    2427    389     390     0.      1.      1.
CBAR    2428    2428    390     391     0.      1.      1.
CBAR    2429    2429    391     392     0.      1.      1.
CBAR    2430    2430    392     393     0.      1.      1.
CBAR    2431    2431    407     357     0.      1.      1.
CBAR    2432    2432    357     409     0.      1.      1.
CBAR    2433    2433    367     358     0.      1.      1.
CBAR    2434    2434    358     375     0.      1.      1.
CBAR    2435    2435    375     384     0.      1.      1.
CBAR    2436    2436    375     406     0.      1.      1.
CBAR    2437    2437    406     408     0.      1.      1.
CBAR    2438    2438    368     359     0.      1.      1.
CBAR    2439    2439    359     376     0.      1.      1.
CBAR    2440    2440    376     384     0.      1.      1.
CBAR    2441    2441    369     360     0.      1.      1.
CBAR    2442    2442    360     377     0.      1.      1.
CBAR    2443    2443    377     385     0.      1.      1.
CBAR    2444    2444    370     361     0.      1.      1.
CBAR    2445    2445    361     378     0.      1.      1.
CBAR    2446    2446    378     386     0.      1.      1.
CBAR    2447    2447    371     362     0.      1.      1.
CBAR    2448    2448    362     379     0.      1.      1.
CBAR    2449    2449    372     363     0.      1.      1.
CBAR    2450    2450    363     380     0.      1.      1.
CBAR    2451    2451    380     382     0.      1.      1.
CBAR    2452    2452    380     388     0.      1.      1.
CBAR    2453    2453    373     364     0.      1.      1.
CBAR    2454    2454    364     381     0.      1.      1.
CBAR    2455    2455    381     383     0.      1.      1.
CBAR    2456    2456    384     389     0.      1.      1.
CBAR    2457    2457    385     390     0.      1.      1.
CBAR    2458    2458    386     391     0.      1.      1.
CBAR    2459    2459    387     392     0.      1.      1.
CBAR    2460    2460    388     393     0.      1.      1.
CBAR    3502    3502    3500    52      1.      1.      0.
CBAR    3503    3502    3501    52      1.      1.      0.
CBEAM   1       1       163     164     1.      0.      0.
CBEAM   2       2       164     153     1.      0.      0.
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CBEAM    3        3      267      154      1.       0.       0.
CBEAM    4        4      154      155      1.       0.       0.
CBEAM    5        5      155      156      1.       0.       0.
CBEAM    6        6      268       36      1.       0.       0.
CBEAM    7        7       36       42      1.       0.       0.
CBEAM    8        8       42       50      1.       0.       0.
CBEAM    9        9       50      437      1.       0.       0.
CBEAM   10       10      437       59      1.       0.       0.
CBEAM   11       11       59      431      1.       0.       0.
CBEAM   12       12      431       71      1.       0.       0.
CBEAM   13       13       71       84      1.       0.       0.
CBEAM   14       14       84      298      1.       0.       0.
CBEAM   15       15      298      286      1.       0.       0.
CBEAM   16       16      286      117      1.       0.       0.
CBEAM   17       17      117      285      1.       1.       0.
CBEAM   18       18      285      283      1.       1.       0.
CBEAM   19       19      283      284      1.       1.       0.
CBEAM   20       20      284      282      1.       1.       0.
CBEAM   21       21      282      281      1.       1.       0.
CBEAM   22       22      281      405      1.       0.       0.
CBEAM   31       31       36       35      1.       1.       0.
CBEAM   32       32       42       41      1.       1.       0.
CBEAM   33       33       50       49      1.       1.       0.
CBEAM   34       34       59       58      1.       1.       0.
CBEAM   35       35       71       70      1.       1.       0.
CBEAM   36       36       84       83      1.       1.       0.
CBEAM   37       37      117      116      1.       1.       0.
CBEAM   38       38       34       31      1.       1.       0.
CBEAM   39       39       40       37      1.       1.       0.
CBEAM   40       40       48       45      1.       1.       0.
CBEAM   41       41       57       54      1.       1.       0.
CBEAM   42       42       69       66      1.       1.       0.
CBEAM   43       43       82       94      1.       1.       0.
CBEAM   44       44       94      118      1.       1.       0.
CBEAM   45       45      118      121      1.       1.       0.
CBEAM   46       46      115       79      1.       1.       0.
CBEAM   47       47       79      120      1.       1.       0.
CBEAM   48       48      120      114      1.       1.       0.
CBEAM   49       49       31       37      1.       1.       0.      +49BM
+49BM   46
CBEAM   50       50       37       45      1.       1.       0.
CBEAM   51       51       45       54      1.       1.       0.
CBEAM   52       52       54       66      1.       1.       0.
CBEAM   53       53       66      121      1.       1.       0.      +53BM
+53BM           456
CBEAM   54       54      121      114      1.       1.       0.      +54BM
+54BM   456
CBEAM   55       55      118      119      1.       1.       0.
CBEAM   56       56      119      120      1.       1.       0.
CBEAM   57       57       94       79      1.       1.       0.
CBEAM  141      141      467      274      1.       1.       0.
CBEAM  142      142      274      465      1.       1.       0.
CBEAM  143      143      465      275      1.       1.       0.
CBEAM  144      144      275      278      1.       1.       0.
CBEAM  145      145      278      280      1.       1.       0.
CBEAM  146      146      280      292      1.       1.       0.
CBEAM  147      147      292      114      1.       1.       0.      +147BM
+147BM          456
CBEAM  148      148      466      273      1.       1.       0.
CBEAM  149      149      273      464      1.       1.       0.
CBEAM  150      150      464      276      1.       1.       0.
CBEAM  151      151      276      279      1.       1.       0.
CBEAM  152      152      279      290      1.       1.       0.
CBEAM  153      153      290      293      1.       1.       0.
CBEAM  154      154      293       79      1.       1.       0.      +154BM
+154BM          456
CBEAM  160      160      295      300      1.       1.       0.
CBEAM  161      161      117      300      1.       1.       0.
CBEAM  162      162      300       79      1.       1.       0.
CBEAM  163      163       79      114      1.       1.       0.
CBEAM  164      164      283      295      1.       1.       0.
CBEAM  165      165      295      294      1.       1.       0.
CBEAM  166      166      293      292      1.       1.       0.
CBEAM  167      167      282      291      1.       1.       0.
CBEAM  168      168      290      280      1.       1.       0.
CBEAM  169      169      279      271      1.       1.       0.      +169BM
+169BM  456
CBEAM  170      170      271      278      1.       1.       0.      +170BM
+170BM           56
CBEAM  171      171      281      277      1.       1.       0.
CBEAM  172      172      276      275      1.       1.       0.
CBEAM  173      173      464      465      1.       1.       0.
CBEAM  174      174      466      467      1.       1.       0.
CBEAM  175      175      271      272      1.       1.       0.      +175BM
+175BM  46
CBEAM  176      176      273      241      1.       1.       0.
CBEAM  177      177      241      299      1.       1.       0.
CBEAM  178      178      299      272      1.       1.       0.
CBEAM  179      179      272      274      1.       1.       0.
CBEAM  180      180      274      233      1.       1.       0.
CBEAM  181      181      195      296      1.       1.       0.      +181BM
+181BM  56
CBEAM  182      182      296      196      1.       1.       0.      +182BM
+182BM           56
CBEAM 1001     1001       33       39      1.       0.       0.
CBEAM 1002     1002       39       47      1.       0.       0.
CBEAM 1003     1003       47       56      1.       0.       0.
CBEAM 1004     1004       56       68      1.       0.       0.
CBEAM 1005     1005       68       81      1.       0.       0.
CBEAM 1007     1007       32       38      1.       0.       0.
CBEAM 1009     1009       30       38      1.       0.       0.
CBEAM 1010     1010       38       46      1.       0.       0.
CBEAM 1011     1011       46       55      1.       0.       0.
CBEAM 1012     1012       55       67      1.       0.       0.
CBEAM 1013     1013       67       80      1.       0.       0.
CBEAM 1014     1014      181      182      1.       0.       0.
CBEAM 1015     1015      182      183      1.       0.       0.
CBEAM 1016     1016      183      184      1.       0.       0.
CBEAM 1017     1017      184      185      1.       0.       0.
CBEAM 1018     1018      185      186      1.       0.       0.
CBEAM 1020     1020       29       44      1.       0.       0.
CBEAM 1022     1022       27       44      1.       0.       0.
CBEAM 1023     1023       44       53      1.       0.       0.
CBEAM 1024     1024       53       65      1.       0.       0.
CBEAM 1025     1025       65       78      1.       0.       0.
CBEAM 1026     1026      187      188      1.       0.       0.      +1026BM
+1026BM 56
CBEAM 1027     1027      188      189      1.       0.       0.
CBEAM 1028     1028      189      190      1.       0.       0.
CBEAM 1029     1029      190      191      1.       0.       0.
CBEAM 1031     1031       26       52      1.       0.       0.
CBEAM 1033     1033       25       52      1.       0.       0.
CBEAM 1034     1034       52       64      1.       0.       0.
CBEAM 1035     1035       64      245      1.       0.       0.
CBEAM 1036     1036       64       77      1.       0.       0.
CBEAM 1037     1037      245       77      1.       0.       0.
CBEAM 1038     1038      192      193      1.       0.       0.
CBEAM 1039     1039      193       63      1.       0.       0.
CBEAM 1040     1040       63      245      1.       0.       0.
CBEAM 1041     1041      245       76      1.       0.       0.
CBEAM 1043     1043       24       51      1.       0.       0.
CBEAM 1045     1045       23       51      1.       0.       0.
CBEAM 1046     1046       51       62      1.       0.       0.
CBEAM 1047     1047       22       62      1.       0.       0.
CBEAM 1048     1048       62      244      1.       0.       0.
CBEAM 1049     1049      244       75      1.       0.       0.
CBEAM 1050     1050       75       88      1.       0.       0.      +1050BM
CBEAM 1051     1051       21       61      1.       0.       0.
CBEAM 1052     1052       61      243      1.       0.       0.
CBEAM 1053     1053      243       74      1.       0.       0.      +1053BM
+1053BM         56
CBEAM 1054     1054       74       87      1.       0.       0.      +1054BM
CBEAM 1056     1056       20       60      1.       0.       0.
CBEAM 1057     1057       60      242      1.       0.       0.
CBEAM 1058     1058      242       73      1.       0.       0.      +1058BM
+1058BM         56
CBEAM 1059     1059       73       86      1.       0.       0.      +1059BM
CBEAM 1060     1060       19      143      1.       0.       0.
CBEAM 1061     1061      143       72      1.       0.       0.
CBEAM 1062     1062       72       85      1.       0.       0.      +1062BM
CBEAM 1071     1071       33       32      0.       1.       0.
CBEAM 1072     1072       32       30      0.       1.       0.
CBEAM 1073     1073       30      181      0.       1.       0.
CBEAM 1074     1074      181       29      0.       1.       0.
CBEAM 1075     1075       39       38      0.       1.       0.
CBEAM 1076     1076       38      182      0.       1.       0.
CBEAM 1077     1077      182       29      0.       1.       0.
CBEAM 1078     1078       29       27      0.       1.       0.
CBEAM 1079     1079       27      187      0.       1.       0.
CBEAM 1080     1080      187       26      0.       1.       0.
CBEAM 1081     1081       47       46      0.       1.       0.
CBEAM 1082     1082       46      183      0.       1.       0.
CBEAM 1083     1083      183       44      0.       1.       0.
CBEAM 1084     1084       44      188      0.       1.       0.
CBEAM 1085     1085      188       26      0.       1.       0.
CBEAM 1086     1086       26       25      0.       1.       0.
CBEAM 1087     1087       25      192      0.       1.       0.
CBEAM 1088     1088      192       24      0.       1.       0.
CBEAM 1089     1089       24       23      0.       1.       0.
CBEAM 1090     1090       23       22      0.       1.       0.
CBEAM 1091     1091       56       55      0.       1.       0.
CBEAM 1092     1092       55      184      0.       1.       0.
CBEAM 1093     1093      184       53      0.       1.       0.
CBEAM 1094     1094       53      189      0.       1.       0.
CBEAM 1095     1095      189       52      0.       1.       0.
CBEAM 1096     1096       52      193      0.       1.       0.
CBEAM 1097     1097      193       51      0.       1.       0.
CBEAM 1098     1098       51       22      0.       1.       0.      +1098BM
+1098BM         56
CBEAM 1099     1099       22       21      0.       1.       0.
CBEAM 1100     1100       21       20      0.       1.       0.
CBEAM 1101     1101       20       19      0.       1.       0.
CBEAM 1102     1102       68       67      0.       1.       0.
CBEAM 1103     1103       67      185      0.       1.       0.
CBEAM 1104     1104      185       65      0.       1.       0.
CBEAM 1105     1105       65      190      0.       1.       0.
CBEAM 1106     1106      190       64      0.       1.       0.
CBEAM 1107     1107       64       63      0.       1.       0.
CBEAM 1108     1108       63       62      0.       1.       0.
CBEAM 1109     1109       62       61      0.       1.       0.
CBEAM 1110     1110       61       60      0.       1.       0.
CBEAM 1111     1111       60       19      0.       1.       0.
CBEAM 1112     1112      245      244      0.       1.       0.
CBEAM 1113     1113      244      243      0.       1.       0.
CBEAM 1114     1114      243      242      0.       1.       0.
CBEAM 1115     1115      242      143      0.       1.       0.
CBEAM 1116     1116       81       80      0.       1.       0.
CBEAM 1117     1117       80      186      0.       1.       0.
CBEAM 1118     1118      186       78      0.       1.       0.
CBEAM 1119     1119       78      191      0.       1.       0.
CBEAM 1120     1120      191       77      0.       1.       0.
CBEAM 1121     1121       77       76      0.       1.       0.
CBEAM 1122     1122       76       75      0.       1.       0.
CBEAM 1123     1123       75       74      0.       1.       0.
CBEAM 1124     1124       74       73      0.       1.       0.
CBEAM 1125     1125       73       72      0.       1.       0.
CBEAM 1126     1126       88       87      0.       1.       0.      +1126BM
CBEAM 1127     1127       87       86      0.       1.       0.
CBEAM 1128     1128       86       85      0.       1.       0.      +1128BM
CBEAM 1131     1131        7       18      1.       0.       0.
CBEAM 1132     1132        6       16      1.       0.       0.
CBEAM 1133     1133       16       17      1.       0.       0.
CBEAM 1134     1134       17       30      1.       0.       0.      +BM1134
+BM1134 5
CBEAM 1135     1135      176      180      1.       0.       0.
CBEAM 1136     1136        5       14      1.       0.       0.
CBEAM 1137     1137       14       15      1.       0.       0.
CBEAM 1138     1138       15       27      1.       0.       0.      +BM1138
+BM1138 5
CBEAM 1139     1139      175      179      1.       0.       0.
CBEAM 1140     1140        4       12      1.       0.       0.
CBEAM 1141     1141       12       13      1.       0.       0.
CBEAM 1142     1142       13       25      1.       0.       0.      +BM1142
+BM1142 5
CBEAM 1143     1143      174      178      1.       0.       0.
CBEAM 1144     1144        3       10      1.       0.       0.
CBEAM 1145     1145       10       11      1.       0.       0.
CBEAM 1146     1146       11       23      1.       0.       0.      +BM1146
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+BM1146 5
CBEAM   1147    1147    173     177     1.      0.      0.
CBEAM   1148    1148    2       194     1.      0.      0.
CBEAM   1149    1149    194     9       1.      0.      0.
CBEAM   1150    1150    9       20      1.      0.      0.      +BM1150
+BM1150 5
CBEAM   1151    1151    1       8       1.      0.      0.
CBEAM   1152    1152    6       7       1.      0.      0.
CBEAM   1153    1153    176     6       1.      0.      0.
CBEAM   1154    1154    5       176     1.      0.      0.
CBEAM   1155    1155    175     5       1.      0.      0.
CBEAM   1156    1156    4       175     1.      0.      0.
CBEAM   1157    1157    174     4       1.      0.      0.
CBEAM   1158    1158    3       174     1.      0.      0.
CBEAM   1159    1159    173     3       1.      0.      0.
CBEAM   1160    1160    2       173     1.      0.      0.
CBEAM   1161    1161    1       2       1.      0.      0.
CBEAM   1162    1162    16      18      1.      0.      0.
CBEAM   1163    1163    180     16      1.      0.      0.
CBEAM   1164    1164    14      180     1.      0.      0.
CBEAM   1165    1165    179     14      1.      0.      0.
CBEAM   1166    1166    12      179     1.      0.      0.
CBEAM   1167    1167    178     12      1.      0.      0.
CBEAM   1168    1168    10      178     1.      0.      0.
CBEAM   1169    1169    177     10      1.      0.      0.
CBEAM   1170    1170    194     177     1.      0.      0.
CBEAM   1171    1171    8       194     1.      0.      0.
CBEAM   1181    1181    81      95      1.      0.      0.      +BM1181
+BM1181         456
CBEAM   1182    1182    95      142     1.      0.      0.
CBEAM   1183    1183    142     101     1.      0.      0.
CBEAM   1184    1184    101     107     1.      0.      0.
CBEAM   1185    1185    107     113     1.      0.      0.
CBEAM   1186    1186    93      141     1.      0.      0.
CBEAM   1187    1187    141     100     1.      0.      0.
CBEAM   1188    1188    100     106     1.      0.      0.
CBEAM   1189    1189    106     112     1.      0.      0.
CBEAM   1190    1190    186     124     1.      0.      0.      +BM1190
+BM1190         456
CBEAM   1191    1191    124     140     1.      0.      0.
CBEAM   1192    1192    140     127     1.      0.      0.
CBEAM   1193    1193    127     130     1.      0.      0.
CBEAM   1194    1194    130     133     1.      0.      0.
CBEAM   1195    1195    92      139     1.      0.      0.
CBEAM   1196    1196    139     99      1.      0.      0.
CBEAM   1197    1197    99      105     1.      0.      0.
CBEAM   1198    1198    105     111     1.      0.      0.
CBEAM   1199    1199    191     123     1.      0.      0.      +BM1199
+BM1199         456
CBEAM   1200    1200    123     138     1.      0.      0.
CBEAM   1201    1201    138     126     1.      0.      0.
CBEAM   1202    1202    126     129     1.      0.      0.
CBEAM   1203    1203    129     132     1.      0.      0.
CBEAM   1204    1204    91      137     1.      0.      0.
CBEAM   1205    1205    137     98      1.      0.      0.
CBEAM   1206    1206    98      104     1.      0.      0.
CBEAM   1207    1207    104     110     1.      0.      0.
CBEAM   1208    1208    122     136     1.      0.      0.
CBEAM   1209    1209    136     125     1.      0.      0.
CBEAM   1210    1210    125     128     1.      0.      0.
CBEAM   1211    1211    128     131     1.      0.      0.
CBEAM   1212    1212    76      90      1.      0.      0.      +BM1212
+BM1212         456
CBEAM   1213    1213    90      135     1.      0.      0.
CBEAM   1214    1214    135     97      1.      0.      0.
CBEAM   1215    1215    97      103     1.      0.      0.
CBEAM   1216    1216    103     109     1.      0.      0.
CBEAM   1217    1217    89      134     1.      0.      0.
CBEAM   1218    1218    134     96      1.      0.      0.
CBEAM   1219    1219    96      102     1.      0.      0.
CBEAM   1220    1220    102     108     1.      0.      0.
CBEAM   1231    1231    141     142     1.      0.      0.
CBEAM   1232    1232    140     141     1.      0.      0.
CBEAM   1233    1233    139     140     1.      0.      0.
CBEAM   1234    1234    138     139     1.      0.      0.
CBEAM   1235    1235    137     138     1.      0.      0.
CBEAM   1236    1236    136     137     1.      0.      0.
CBEAM   1237    1237    135     136     1.      0.      0.
CBEAM   1238    1238    134     135     1.      0.      0.
CBEAM   1241    1241    100     101     1.      0.      0.
CBEAM   1242    1242    127     100     1.      0.      0.
CBEAM   1243    1243    99      127     1.      0.      0.
CBEAM   1244    1244    126     99      1.      0.      0.
CBEAM   1245    1245    98      126     1.      0.      0.
CBEAM   1246    1246    125     98      1.      0.      0.
CBEAM   1247    1247    97      125     1.      0.      0.
CBEAM   1248    1248    96      97      1.      0.      0.
CBEAM   1251    1251    106     107     1.      0.      0.
CBEAM   1252    1252    130     106     1.      0.      0.
CBEAM   1253    1253    105     130     1.      0.      0.
CBEAM   1254    1254    129     105     1.      0.      0.
CBEAM   1255    1255    104     129     1.      0.      0.
CBEAM   1256    1256    128     104     1.      0.      0.
CBEAM   1257    1257    103     128     1.      0.      0.
CBEAM   1258    1258    102     103     1.      0.      0.
CBEAM   1261    1261    112     113     1.      0.      0.
CBEAM   1262    1262    133     112     1.      0.      0.
CBEAM   1263    1263    111     133     1.      0.      0.
CBEAM   1264    1264    132     111     1.      0.      0.
CBEAM   1265    1265    110     132     1.      0.      0.
CBEAM   1266    1266    131     110     1.      0.      0.
CBEAM   1267    1267    109     131     1.      0.      0.
CBEAM   1268    1268    108     109     1.      0.      0.
CBEAM   2001    2001    251     506     1.      1.      0.      +BM2001
+BM2001 456
CBEAM   2002    2002    506     233     1.      1.      0.
CBEAM   2003    2003    233     517     1.      1.      0.
CBEAM   2004    2004    517     262     1.      1.      0.      +BM2004
+BM2004         456
CBEAM   2005    2005    252     507     1.      1.      0.      +BM2005
+BM2005 456
CBEAM   2006    2006    507     257     1.      1.      0.
CBEAM   2007    2007    257     518     1.      1.      0.
CBEAM   2008    2008    518     262     1.      1.      0.      +BM2008
+BM2008         456
CBEAM   2009    2009    253     508     1.      1.      0.      +BM2009
+BM2009 456
CBEAM   2010    2010    508     258     1.      1.      0.
CBEAM   2011    2011    258     519     1.      1.      0.
CBEAM   2012    2012    519     263     1.      1.      0.      +BM2012
+BM2012         456
CBEAM   2013    2013    254     509     1.      1.      0.      +BM2013
+BM2013 456
CBEAM   2014    2014    509     259     1.      1.      0.
CBEAM   2015    2015    259     520     1.      1.      0.
CBEAM   2016    2016    520     264     1.      1.      0.      +BM2016
+BM2016         456
CBEAM   2017    2017    255     510     1.      1.      0.      +BM2017
+BM2017 456
CBEAM   2018    2018    510     260     1.      1.      0.
CBEAM   2019    2019    260     521     1.      1.      0.
CBEAM   2020    2020    521     265     1.      1.      0.      +BM2020
+BM2020         456
CBEAM   2021    2021    256     511     1.      1.      0.      +BM2021
+BM2021 456
CBEAM   2022    2022    511     261     1.      1.      0.      +BM2022
+BM2022         456
CBEAM   2023    2023    261     522     1.      1.      0.      +BM2023
+BM2023 456
CBEAM   2024    2024    522     266     1.      1.      0.      +BM2024
+BM2024         456
CBEAM   2031    2031    251     501     1.      1.      0.      +BM2031
+BM2031 456
CBEAM   2032    2032    501     252     1.      1.      0.
CBEAM   2033    2033    252     502     1.      1.      0.
CBEAM   2034    2034    502     253     1.      1.      0.
CBEAM   2035    2035    253     503     1.      1.      0.
CBEAM   2036    2036    503     254     1.      1.      0.
CBEAM   2037    2037    254     504     1.      1.      0.
CBEAM   2038    2038    504     255     1.      1.      0.
CBEAM   2039    2039    255     505     1.      1.      0.
CBEAM   2040    2040    505     256     1.      1.      0.      +BM2040
+BM2040         456
CBEAM   2041    2041    233     512     1.      1.      0.
CBEAM   2042    2042    512     257     1.      1.      0.
CBEAM   2043    2043    257     513     1.      1.      0.
CBEAM   2044    2044    513     258     1.      1.      0.
CBEAM   2045    2045    258     514     1.      1.      0.
CBEAM   2046    2046    514     259     1.      1.      0.
CBEAM   2047    2047    259     515     1.      1.      0.
CBEAM   2048    2048    515     260     1.      1.      0.
CBEAM   2049    2049    260     516     1.      1.      0.
CBEAM   2050    2050    516     261     1.      1.      0.      +BM2050
+BM2050         456
CBEAM   2051    2051    262     523     1.      1.      0.      +BM2051
+BM2051 456
CBEAM   2052    2052    523     263     1.      1.      0.
CBEAM   2053    2053    263     524     1.      1.      0.
CBEAM   2054    2054    524     264     1.      1.      0.
CBEAM   2055    2055    264     525     1.      1.      0.
CBEAM   2056    2056    525     265     1.      1.      0.
CBEAM   2057    2057    265     526     1.      1.      0.
CBEAM   2058    2058    526     266     1.      1.      0.      +BM2058
+BM2058         456
CBEAM   3026    3026    19      3020    0.      1.      0.
CBEAM   3027    3027    3016    3021    0.      1.      0.
CBEAM   3028    3028    3017    3018    1.      0.      0.
CBEAM   3029    3029    3018    3019    1.      0.      0.
CBEAM   3030    3030    3019    3020    1.      0.      0.
CBEAM   3031    3031    3020    3021    1.      0.      0.
CBEAM   3032    3032    3021    3022    1.      0.      0.      +3032
+3032           5
CBEAM   3081    3081    21      3046    0.      0.      1.      +3081
+3081   56
CBEAM   3082    3082    3046    61      0.      0.      1.      +3082
+3082           56
CBEAM   3083    3083    3046    3049    0.      1.      0.      +3083
+3083           6
CBEAM   3084    3083    3049    3054    0.      1.      0.
CBEAM   3085    3085    3053    3054    0.      0.      1.      +3085
+3085   56
CBEAM   3086    3085    3054    3055    0.      0.      1.      +3086
+3086           56
CBEAM   3087    3087    3047    3053    0.      1.      0.      +3087
+3087           6
CBEAM   3088    3088    3047    3048    0.      0.      1.
CBEAM   3089    3089    3048    3055    0.      1.      0.
CBEAM   3090    3090    3050    3051    0.      0.      1.      +3090
+3090   5
CBEAM   3091    3091    3051    3053    0.      0.      1.
CBEAM   3092    3092    3053    3055    0.      0.      1.
CBEAM   3093    3093    3055    3057    0.      0.      1.      +3093
+3093           5
CBEAM   3094    3094    3050    3053    0.      0.      1.      +3094
+3094   56
CBEAM   3095    3095    3053    3055    0.      0.      1.
CBEAM   3096    3096    3055    3057    0.      0.      1.      +3096
+3096           56
CBEAM   3097    3097    3050    3059    0.      1.      0.      +3097
+3097   46
CBEAM   3098    3098    3051    3061    0.      1.      0.      +3098
+3098   246
CBEAM   3099    3099    3057    3062    0.      1.      0.      +3099
+3099   246
CBEAM   3100    3100    3058    3059    0.      0.      1.
CBEAM   3101    3100    3059    3060    0.      0.      1.
CBEAM   3102    3100    3060    3061    0.      0.      1.
CBEAM   3103    3100    3061    3062    0.      0.      1.
CBEAM   3391    3391    29      3196    0.      0.      1.      +3391
+3391   456
CBEAM   3392    3391    3196    182     0.      0.      1.      +3392
+3392           456
CBEAM   3393    3391    182     3197    0.      0.      1.      +3393
+3393   456
CBEAM   3394    3391    3197    38      0.      0.      1.      +3394
+3394           456
CBEAM   3395    3391    44      3198    0.      0.      1.      +3395
+3395   456
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CBEAM   3396    3391    3198    183     0.      0.      1.              +3396
+3396           456
CBEAM   3397    3391    183     3199    0.      0.      1.              +3397
+3397   456
CBEAM   3398    3391    3199    46      0.      0.      1.              +3398
+3398           456
CBEAM   3399    3391    3198    3200    0.      0.      1.
CBEAM   3400    3391    3200    3196    0.      0.      1.
CBEAM   3401    3391    3199    3202    0.      0.      1.
CBEAM   3402    3391    3202    3197    0.      0.      1.
CBEAM   3403    3391    3200    3201    0.      0.      1.              +3403
+3403   5
CBEAM   3404    3391    3201    3202    0.      0.      1.              +3404
+3404           5
CBEAM   3405    3405    3203    3204    0.      0.      1.
CBEAM   3406    3405    3204    3205    0.      0.      1.
CBEAM   3407    3407    3204    3206    0.      1.      0.              +3407
+3407           6
CBEAM   3408    3407    3206    3207    0.      1.      0.
CBEAM   3409    3409    3207    3208    0.      0.      1.
CBEAM   3410    3409    3209    3212    0.      1.      0.
CBEAM   3411    3405    3210    3211    0.      0.      1.
CBEAM   3412    3409    3211    3212    0.      0.      1.
CBEAM   3413    3405    3212    3213    0.      0.      1.
CBEAM   5002    5002    153     267     1.      0.      0.
CBEAM   5051    5051    156     458     1.      0.      0.
CBEAM   5052    5052    458     459     1.      0.      0.
CBEAM   5053    5053    459     268     1.      0.      0.
CELAS2  61      36.6E6  34      5       35      5
CELAS2  62      71.0E6  40      5       41      5
CELAS2  63      94.1E6  48      5       49      5
CELAS2  64      132.4E6 57      5       58      5
CELAS2  65      110.0E6 69      5       70      5
CELAS2  66      51.7E6  82      5       83      5
CELAS2  67      5.0E6   115     5       116     5
CELAS2  191     11.25E6 277     5       276     5
CELAS2  192     22.0E6  291     5       290     5
CELAS2  193     9.68E6  294     5       293     5
CELAS2  194     156610. 298     3       195     3
CELAS2  195     67829.  284     3       196     3
CELAS2  1172    5650000.17      4       30      4
CELAS2  1173    5590000.15      4       27      4
CELAS2  1174    1600000.13      4       25      4
CELAS2  1175    2030000.11      4       23      4
CELAS2  1221    3307000.142     4       141     4
CELAS2  1222    268300. 141     4       140     4
CELAS2  1223    137300. 140     4       139     4
CELAS2  1224    105200. 139     4       138     4
CELAS2  1225    85600.  138     4       137     4
CELAS2  1226    69900.  137     4       136     4
CELAS2  1227    57700.  136     4       135     4
CELAS2  1228    40000.  135     4       134     4
CELAS2  1229    6229750.142     4       119     4
CELAS2  3104    193.E6  3046    4       3054    4
CELAS2  3414    1515.E5 3204    4       3207    4
CELAS2  3415    1724.E5 3212    4       3208    4
CELAS2  3416    580.4E5 3204    6       3207    6
CELAS2  3417    2652.5E53208    6       3209    6
CELAS2  3418    732.68E53208    5       3209    5
CONM1   301     19      0                               +301
+301    9.565
CONM1   302     72      0                               +302
+302    6.770
CONM1   303     20      0                               +303
+303    7.972
CONM1   304     60      0                               +304
+304    10.110
CONM1   305     73      0                               +305
+305    7.755
CONM1   306     21      0                               +306
+306    13.712
CONM1   307     61      0                               +307
+307    20.285
CONM1   308     74      0                               +308
+308    9.982
CONM1   309     51      0                               +309
+309    32.156
CONM1   310     62      0                               +310
+310    25.281
CONM1   311     75      0                               +311
+311    14.285
CONM1   312     26      0                               +312
+312    42.942
CONM1   313     52      0                               +313
+313    57.288
CONM1   314     64      0                               +314
+314    46.648
CONM1   315     77      0                               +315
+315    20.983
CONM1   316     29      0                               +316
+316    60.677
CONM1   317     44      0                               +317
+317    80.964
CONM1   318     53      0                               +318
+318    74.861
CONM1   319     65      0                               +319
+319    56.266
CONM1   320     78      0                               +320
+320    28.341
CONM1   321     33      0                               +321
+321    37.654
CONM1   322     39      0                               +322
+322    99.621
CONM1   323     47      0                               +323
+323    105.244
CONM1   324     56      0                               +324
+324    95.811
CONM1   325     68      0                               +325
+325    83.620
CONM1   326     81      0                               +326
+326    33.148
CONM1   341     85      0                               +341
+341    .6
CONM1   342     86      0                               +342
+342    1.6
CONM1   343     87      0                               +343
+343    1.8
CONM1   344     88      0                               +344
+344    1.
CONM1   345     6       0                               +345
+345    12.03
CONM1   346     17      0                               +346
+346    57.78
CONM1   347     5       0                               +347
+347    10.08
CONM1   348     15      0                               +348
+348    42.72
CONM1   349     4       0                               +349
+349    6.92
CONM1   350     13      0                               +350
+350    27.67
CONM1   351     3       0                               +351
+351    5.17
CONM1   352     11      0                               +352
+352    27.65
CONM1   353     2       0                               +353
+353    4.08
CONM1   354     9       0                               +354
+354    3.71
CONM1   355     95      0                               +355
+355    9.133
CONM1   356     107     0                               +356
+356    6.765
CONM1   357     113     0                               +357
+357    .022
CONM1   358     93      0                               +358
+358    10.32
CONM1   359     106     0                               +359
+359    10.12
CONM1   360     112     0                               +360
+360    .149
CONM1   361     124     0                               +361
+361    5.816
CONM1   362     130     0                               +362
+362    7.986
CONM1   363     133     0                               +363
+363    .998
CONM1   364     92      0                               +364
+364    4.56
CONM1   365     105     0                               +365
+365    6.797
CONM1   366     111     0                               +366
+366    .952
CONM1   367     123     0                               +367
+367    3.296
CONM1   368     129     0                               +368
+368    4.727
CONM1   369     132     0                               +369
+369    .647
CONM1   370     91      0                               +370
+370    2.069
CONM1   371     104     0                               +371
+371    3.014
CONM1   372     110     0                               +372
+372    .477
CONM1   373     122     0                               +373
+373    1.784
CONM1   374     128     0                               +374
+374    2.632
CONM1   375     131     0                               +375
+375    .435
CONM1   376     90      0                               +376
+376    1.644
CONM1   377     103     0                               +377
+377    2.354
CONM1   378     109     0                               +378
+378    .272
CONM1   379     89      0                               +379
+379    .651
CONM1   380     102     0                               +380
+380    1.075
CONM1   381     108     0                               +381
+381    .284
CONM1   391     163     0                               +391
+391    314.21
CONM1   392     153     0                               +392
+392    463.77
CONM1   393     154     0                               +393
+393    870.68
CONM1   394     155     0                               +394
+394    1299.38
CONM1   395     156     0                               +395
+395    1545.78
CONM1   396     42      0                               +396
+396    1799.25
CONM1   397     71      0                               +397
+397    1412.77
CONM1   398     286     0                               +398
+398    893.77
CONM1   399     284     0                               +399
+399    335.19
CONM1   400     281     0                               +400
+400    708.33
CONM1   401     163     0       314.21
CONM1   402     153     0       463.77
CONM1   403     154     0       870.68
CONM1   404     155     0       1299.38
CONM1   405     156     0       1545.78
CONM1   406     42      0       2036.16
CONM1   407     71      0       2468.11
CONM1   408     286     0       893.77
CONM1   409     284     0       311.29
CONM1   410     281     0       796.72
CONM1   411     153     0                               +411
+411                                                    +411A
+411A           119126.
CONM1   412     154     0                               +412
+412                                                    +412A
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+412A           498740.
CONM1   413     155     0                                               +413
+413                                                                    +413A
+413A           233410.
CONM1   414     156     0                                               +414
+414                                                                    +414A
+414A           865169.
CONM1   415     42      0                                               +415
+415                                                                    +415A
+415A           1051483.
CONM1   416     71      0                                               +416
+416                                                                    +416A
+416A           1042917.
CONM1   417     286     0                                               +417
+417                                                                    +417A
+417A           556929.
CONM1   418     284     0                                               +418
+418                                                                    +418A
+418A           756147.
CONM1   430     195     0                                               +430
+430    -82.94
CONM1   431     296     0                                               +431
+431                            3803477.
CONM1   432     296     0                                               +432
+432    2073.44
CONM1   433     42      0                       12204.0
CONM1   434     437     0                                               +434
+434                                                                    +434A
+434A                                                   19.7E6
CONM1   435     281     0                                               +435
+435                                                                    +435A
+435A                                                   945062.
CONM1   436     410     0                                               +436
+436                                                                    +436A
+436A           502624.
CONM1   437     410     0                                               +437
+437                                                                    +437A
+437A                                                   3604069.
CONM1   438     410     0       1990.5
CONM1   446     251     0                                               +446
+446    4.65
CONM1   447     252     0                                               +447
+447    5.123
CONM1   448     253     0                                               +448
+448    4.812
CONM1   449     254     0                                               +449
+449    3.069
CONM1   450     255     0                                               +450
+450    1.73
CONM1   451     256     0                                               +451
+451    2.547
CONM1   452     233     0                                               +452
+452    176.302
CONM1   453     257     0                                               +453
+453    31.053
CONM1   454     258     0                                               +454
+454    17.674
CONM1   455     259     0                                               +455
+455    11.742
CONM1   456     260     0                                               +456
+456    7.391
CONM1   457     261     0                                               +457
+457    2.877
CONM1   458     262     0                                               +458
+458    3.675
CONM1   459     263     0                                               +459
+459    3.064
CONM1   460     264     0                                               +460
+460    2.838
CONM1   461     265     0                                               +461
+461    2.73
CONM1   462     266     0                                               +462
+462    .976
CONM1   501     407     0       18.24
CONM1   502     409     0       24.64
CONM1   503     367     0       23.43
CONM1   504     408     0       30.93
CONM1   505     368     0       4.55
CONM1   506     359     0       15.9
CONM1   507     384     0       15.24
CONM1   508     389     0       .75
CONM1   509     369     0       3.81
CONM1   510     360     0       6.67
CONM1   511     385     0       5.77
CONM1   512     390     0       1.11
CONM1   513     370     0       2.55
CONM1   514     361     0       3.55
CONM1   515     386     0       3.1
CONM1   516     391     0       .93
CONM1   517     371     0       1.12
CONM1   518     362     0       2.9
CONM1   519     387     0       2.4
CONM1   520     392     0       .59
CONM1   521     393     0       .37
CONM1   522     373     0       1.94
CONM1   523     364     0       .48
CONM1   524     381     0       2.66
CONM1   525     383     0       .89
CONM1   526     281                                                    +526
+526                            822933.
CONM1   3042    3018            56.69           56.69                  +3042
+3042   56.69                   64266.                                 +3042A
+3042A          0.                                              64266.
CONM1   3043    3019                                                   +3043
+3043   -4.70
CONM1   3044    3022            35.01           35.01                  +3044
+3044   37.01
CONM1   3045    3060            200.            200.                   +3045
+3045   200.                    236476.8                               +3045A
+3045A          1947.                                           236476.
CONM1   3047    3017                                                   +3047
+3047   .010
CONM1   3117    3046    0                                              +3117
+3117   25.4
CONM1   3118    3049    0                       25.4
CONM1   3119    3050    0       46.57                                  +3119
+3119   46.57
CONM1   3120    3053    0       9.79                                   +3120
+3120   -2.91
CONM1   3121    3054    0                       67.50
CONM1   3122    3057    0       23.84                                  +3122
+3122   23.84
CONM1   3427    3204    0                                              +3427
+3427   208.0                   125.E3
CONM1   3428    3206    0                       208.
CONM1   3429    3207    0       208.0                                  +3429
+3429                                                                  +3429A
+3429A                                                  125.E3
CONM1   3430    3210    0       .01                                    +40430
+40430  .01
CONM1   3431    3211    0       229.3                                  +40431
+40431  229.3                   561149.                                +40431A
+40431A         32000.                                          561149.
CONM1   3432    3212    0                       231.3
CONM1   3433    3213    0       2.0                                    +40433
+40433  2.0
CONM2   3501    3500            502.    0.      0.      0.             +000001
++000001648549.2        8160.8                  649152.0               +000002
CONM2   3504    3501            138.    0.      0.      0.             +000003
++000003666538.01       6769.7                  62828.60               +000004
CONROD  183     272     233     2               16.0875
CONROD  2201    233     1233    2       .0001
CONROD  2202    233     2233    2       .0001
CONROD  2203    251     1251    2       .0001
CONROD  2204    251     2251    2       .0001
CONROD  2205    252     1252    2       .0001
CONROD  2206    252     2252    2       .0001
CONROD  2207    253     1253    2       .0001
CONROD  2208    253     2253    2       .0001
CONROD  2209    254     1254    2       .0001
CONROD  2210    254     2254    2       .0001
CONROD  2211    255     1255    2       .0001
CONROD  2212    255     2255    2       .0001
CONROD  2213    256     1256    2       .0001
CONROD  2214    256     2256    2       .0001
CONROD  2215    257     1257    2       .0001
CONROD  2216    257     2257    2       .0001
CONROD  2217    258     1258    2       .0001
CONROD  2218    258     2258    2       .0001
CONROD  2219    259     1259    2       .0001
CONROD  2220    259     2259    2       .0001
CONROD  2221    260     1260    2       .0001
CONROD  2222    260     2260    2       .0001
CONROD  2223    261     1261    2       .0001
CONROD  2224    261     2261    2       .0001
CONROD  2225    262     1262    2       .0001
CONROD  2226    262     2262    2       .0001
CONROD  2227    263     1263    2       .0001
CONROD  2228    263     2263    2       .0001
CONROD  2229    264     1264    2       .0001
CONROD  2230    264     2264    2       .0001
CONROD  2231    265     1265    2       .0001
CONROD  2232    265     2265    2       .0001
CONROD  2233    266     1266    2       .0001
CONROD  2234    266     2266    2       .0001
CONROD  3033    3018    3020    2               20.
CONROD  3034    3020    3022    2               20.
CORD1R  5       701     702     703
CORD2C *3               0               -63.574         -294.247        *CORD3A
*CORD3A 0.              -143.398002     -351.530085     0.              +CORD3B
+CORD3B -63.574 -294.247100.
CORD2R  1       0       -62.153 -293.2270.      -62.153 -293.227100.    *CORD1
*CORD1  19.092002       -234.923915     0.
CORD2R  7       0       -41.5   -378.02 0.      -41.5   -379.02 100.    *CORD7
*CORD7  57.2946361      -362.5403399    0.
CQUAD4  601     601     1033    1039    1038    1032
CQUAD4  602     602     1039    1047    1046    1038
CQUAD4  603     603     1047    1056    1055    1046
CQUAD4  604     604     1056    1068    1067    1055
CQUAD4  605     605     1068    1081    1080    1067
CQUAD4  607     607     1038    1182    1181    1030
CQUAD4  608     608     1038    1046    1183    1182
CQUAD4  609     609     1046    1055    1184    1183
CQUAD4  610     610     1055    1067    1185    1184
CQUAD4  611     611     1067    1080    1186    1185
CQUAD4  613     613     1182    1183    1044    1029
CQUAD4  614     614     1183    1184    1053    1044
CQUAD4  615     615     1184    1185    1065    1053
CQUAD4  616     616     1185    1186    1078    1065
CQUAD4  618     618     1027    1044    1188    1187
CQUAD4  619     619     1044    1053    1189    1188
CQUAD4  620     620     1053    1065    1190    1189
CQUAD4  621     621     1065    1078    1191    1190
CQUAD4  623     623     1188    1189    1052    1026
CQUAD4  624     624     1189    1190    1064    1052
CQUAD4  625     625     1190    1191    1077    1064
CQUAD4  627     627     1025    1052    1193    1192
CQUAD4  628     628     1052    1064    1063    1193
CQUAD4  632     632     1192    1193    1051    1024
CQUAD4  633     633     1193    1063    1062    1051
CQUAD4  634     634     1063    1245    1244    1062
CQUAD4  635     635     1245    1076    1075    1244
CQUAD4  639     639     1062    1061    1021    1022
CQUAD4  640     640     1062    1244    1243    1061
CQUAD4  641     641     1244    1075    1074    1243
CQUAD4  643     643     1021    1061    1060    1020
CQUAD4  644     644     1061    1243    1242    1060
CQUAD4  645     645     1243    1074    1073    1242
CQUAD4  648     648     1060    1242    1143    1019
CQUAD4  649     649     1242    1073    1072    1143
CQUAD4  661     661     1142    1101    1100    1141
CQUAD4  662     662     1101    1107    1106    1100
CQUAD4  663     663     1107    1113    1112    1106
CQUAD4  664     664     1141    1100    1127    1140
CQUAD4  665     665     1100    1106    1130    1127
CQUAD4  666     666     1106    1112    1133    1130
CQUAD4  667     667     1140    1127    1099    1139
CQUAD4  668     668     1127    1130    1105    1099
```

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CQUAD4  669     669     1130    1133    1111    1105
CQUAD4  670     670     1139    1099    1126    1138
CQUAD4  671     671     1099    1105    1129    1126
CQUAD4  672     672     1105    1111    1132    1129
CQUAD4  673     673     1138    1126    1098    1137
CQUAD4  674     674     1126    1129    1104    1098
CQUAD4  675     675     1129    1132    1110    1104
CQUAD4  676     676     1137    1098    1125    1136
CQUAD4  677     677     1098    1104    1128    1125
CQUAD4  678     678     1104    1110    1131    1128
CQUAD4  679     679     1136    1125    1097    1135
CQUAD4  680     680     1125    1128    1103    1097
CQUAD4  681     681     1128    1131    1109    1103
CQUAD4  682     682     1135    1097    1096    1134
CQUAD4  683     683     1097    1103    1102    1096
CQUAD4  684     684     1103    1109    1108    1102
CQUAD4  1601    601     2033    2039    2038    2032
CQUAD4  1602    602     2039    2047    2046    2038
CQUAD4  1603    603     2047    2056    2055    2046
CQUAD4  1604    604     2056    2068    2067    2055
CQUAD4  1605    605     2068    2081    2080    2067
CQUAD4  1607    607     2038    2182    2181    2030
CQUAD4  1608    608     2038    2046    2183    2182
CQUAD4  1609    609     2046    2055    2184    2183
CQUAD4  1610    610     2055    2067    2185    2184
CQUAD4  1611    611     2067    2080    2186    2185
CQUAD4  1613    613     2182    2183    2044    2029
CQUAD4  1614    614     2183    2184    2053    2044
CQUAD4  1615    615     2184    2185    2065    2053
CQUAD4  1616    616     2185    2186    2078    2065
CQUAD4  1618    618     2027    2044    2188    2187
CQUAD4  1619    619     2044    2053    2189    2188
CQUAD4  1620    620     2053    2065    2190    2189
CQUAD4  1621    621     2065    2078    2191    2190
CQUAD4  1623    623     2188    2189    2052    2026
CQUAD4  1624    624     2189    2190    2064    2052
CQUAD4  1625    625     2190    2191    2077    2064
CQUAD4  1627    627     2025    2052    2193    2192
CQUAD4  1628    628     2052    2064    2063    2193
CQUAD4  1632    632     2192    2193    2051    2024
CQUAD4  1633    633     2193    2063    2062    2051
CQUAD4  1634    634     2063    2245    2244    2062
CQUAD4  1635    635     2245    2076    2075    2244
CQUAD4  1639    639     2062    2061    2021    2022
CQUAD4  1640    640     2062    2244    2243    2061
CQUAD4  1641    641     2244    2075    2074    2243
CQUAD4  1643    643     2021    2061    2060    2020
CQUAD4  1644    644     2061    2243    2242    2060
CQUAD4  1645    645     2243    2074    2073    2242
CQUAD4  1648    648     2060    2242    2143    2019
CQUAD4  1649    649     2242    2073    2072    2143
CQUAD4  1661    661     2142    2101    2100    2141
CQUAD4  1662    662     2101    2107    2106    2100
CQUAD4  1663    663     2107    2113    2112    2106
CQUAD4  1664    664     2141    2100    2127    2140
CQUAD4  1665    665     2100    2106    2130    2127
CQUAD4  1666    666     2106    2112    2133    2130
CQUAD4  1667    667     2140    2127    2099    2139
CQUAD4  1668    668     2127    2130    2105    2099
CQUAD4  1669    669     2130    2133    2111    2105
CQUAD4  1670    670     2139    2099    2126    2138
CQUAD4  1671    671     2099    2105    2129    2126
CQUAD4  1672    672     2105    2111    2132    2129
CQUAD4  1673    673     2138    2126    2098    2137
CQUAD4  1674    674     2126    2129    2104    2098
CQUAD4  1675    675     2129    2132    2110    2104
CQUAD4  1676    676     2137    2098    2125    2136
CQUAD4  1677    677     2098    2104    2128    2125
CQUAD4  1678    678     2104    2110    2131    2128
CQUAD4  1679    679     2136    2125    2097    2135
CQUAD4  1680    680     2125    2128    2103    2097
CQUAD4  1681    681     2128    2131    2109    2103
CQUAD4  1682    682     2135    2097    2096    2134
CQUAD4  1683    683     2097    2103    2102    2096
CQUAD4  1684    684     2103    2109    2108    2102
CQUAD8  701     701     1257    1252    1251    1233    1507    1501    +701
+701    1506    1512                                    99.5
CQUAD8  702     702     1252    1257    1258    1253    1507    1513    +702
+702    1508    1502                                    99.5
CQUAD8  703     703     1253    1258    1259    1254    1508    1514    +703
+703    1509    1503                                    99.5
CQUAD8  704     704     1254    1259    1260    1255    1509    1515    +704
+704    1510    1504                                    99.5
CQUAD8  705     705     1255    1260    1261    1256    1510    1516    +705
+705    1511    1505                                    99.5
CQUAD8  707     707     1257    1262    1263    1258    1518    1523    +707
+707    1519    1513                                    99.5
CQUAD8  708     708     1258    1263    1264    1259    1519    1524    +708
+708    1520    1514                                    99.5
CQUAD8  709     709     1259    1264    1265    1260    1520    1525    +709
+709    1521    1515                                    99.5
CQUAD8  710     710     1260    1265    1266    1261    1521    1526    +710
+710    1522    1516                                    99.5
CQUAD8  1701    701     2257    2252    2251    2233    2507    2501    +1701
+1701   2506    2512                                    99.5
CQUAD8  1702    702     2252    2257    2258    2253    2507    2513    +1702
+1702   2508    2502                                    99.5
CQUAD8  1703    703     2253    2258    2259    2254    2508    2514    +1703
+1703   2509    2503                                    99.5
CQUAD8  1704    704     2254    2259    2260    2255    2509    2515    +1704
+1704   2510    2504                                    99.5
CQUAD8  1705    705     2255    2260    2261    2256    2510    2516    +1705
+1705   2511    2505                                    99.5
CQUAD8  1707    707     2257    2262    2263    2258    2518    2523    +1707
+1707   2519    2513                                    99.5
CQUAD8  1708    708     2258    2263    2264    2259    2519    2524    +1708
+1708   2520    2514                                    99.5
CQUAD8  1709    709     2259    2264    2265    2260    2520    2525    +1709
+1709   2521    2515                                    99.5
CQUAD8  1710    710     2260    2265    2266    2261    2521    2526    +1710
+1710   2522    2516                                    99.5
CSHEAR  71      71      1034    1040    1037    1031
CSHEAR  72      72      1040    1048    1045    1037
CSHEAR  73      73      1048    1057    1054    1045
CSHEAR  74      74      1057    1069    1066    1054
CSHEAR  75      75      1069    1082    1121    1066
CSHEAR  76      76      1094    1079    1114    1121
CSHEAR  77      71      2034    2040    2037    2031
CSHEAR  78      72      2040    2048    2045    2037
CSHEAR  79      73      2048    2057    2054    2045
CSHEAR  80      74      2057    2069    2066    2054
CSHEAR  81      75      2069    2082    2121    2066
CSHEAR  82      76      2094    2079    2114    2121
CSHEAR  201     201     1465    1464    1466    1467
CSHEAR  202     202     1275    1276    1464    1465
CSHEAR  203     203     1280    1290    1276    1275
CSHEAR  204     204     1114    1079    1293    1292
CSHEAR  205     201     2465    2464    2466    2467
CSHEAR  206     202     2275    2276    2464    2465
CSHEAR  207     203     2280    2290    2276    2275
CSHEAR  208     204     2114    2079    2293    2292
CSHEAR  642     642     1075    1088    1087    1074
CSHEAR  646     646     1074    1087    1086    1073
CSHEAR  650     650     1073    1086    1085    1072
CSHEAR  651     651     1007    1018    1016    1006
CSHEAR  652     652     1006    1016    1180    1176
CSHEAR  653     653     1176    1180    1014    1005
CSHEAR  654     654     1005    1014    1179    1175
CSHEAR  655     655     1175    1179    1012    1004
CSHEAR  656     656     1004    1012    1178    1174
CSHEAR  657     657     1174    1178    1010    1003
CSHEAR  658     658     1003    1010    1177    1173
CSHEAR  659     659     1173    1177    1194    1002
CSHEAR  660     660     1002    1194    1008    1001
CSHEAR  1642    642     2075    2088    2087    2074
CSHEAR  1646    646     2074    2087    2086    2073
CSHEAR  1650    650     2073    2086    2085    2072
CSHEAR  1651    651     2007    2018    2016    2006
CSHEAR  1652    652     2006    2016    2180    2176
CSHEAR  1653    653     2176    2180    2014    2005
CSHEAR  1654    654     2005    2014    2179    2175
CSHEAR  1655    655     2175    2179    2012    2004
CSHEAR  1656    656     2004    2012    2178    2174
CSHEAR  1657    657     2174    2178    2010    2003
CSHEAR  1658    658     2003    2010    2177    2173
CSHEAR  1659    659     2173    2177    2194    2002
CSHEAR  1660    660     2002    2194    2008    2001
CSHEAR  3105    3105    3063    3064    3066    3065
CSHEAR  3106    3105    3067    3068    3070    3069
CTRIA3  606     606     1032    1038    1030
CTRIA3  612     612     1181    1182    1029
CTRIA3  617     617     1029    1044    1027
CTRIA3  622     622     1187    1188    1026
CTRIA3  626     626     1026    1052    1025
CTRIA3  629     629     1064    1245    1063
CTRIA3  630     630     1064    1077    1245
CTRIA3  631     631     1077    1076    1245
CTRIA3  636     636     1051    1023    1024
CTRIA3  637     637     1051    1022    1023
CTRIA3  638     638     1062    1022    1051
CTRIA3  647     647     1019    1020    1060
CTRIA3  1606    606     2032    2038    2030
CTRIA3  1612    612     2181    2182    2029
CTRIA3  1617    617     2029    2044    2027
CTRIA3  1622    622     2187    2188    2026
CTRIA3  1626    626     2026    2052    2025
CTRIA3  1629    629     2064    2245    2063
CTRIA3  1630    630     2064    2077    2245
CTRIA3  1631    631     2077    2076    2245
CTRIA3  1636    636     2051    2023    2024
CTRIA3  1637    637     2051    2022    2023
CTRIA3  1638    638     2062    2022    2051
CTRIA3  1647    647     2019    2020    2060
CTRIA6  706     706     1262    1257    1233    1518    1512    1517    +706
+706    99.5
CTRIA6  1706    706     2262    2257    2233    2518    2512    2517    +1706
+1706   99.5
DMIG    VTAIL   0       6       1       0
DMIG    *VTAIL          357             1                               *9001
*9001   357             1               0.127440E+06
DMIG    *VTAIL          358             1                               *9002
*9002   357             1               -.217072E+05                    *9003
*9003   358             1               0.680971E+05
DMIG    *VTAIL          359             1                               *9004
*9004   357             1               0.352175E+03                    *9005
*9005   358             1               -.193333E+05                    *9006
*9006   359             1               0.717224E+05
DMIG    *VTAIL          360             1                               *9007
*9007   357             1               0.456481E+03                    *9008
*9008   358             1               -.301624E+03                    *9009
*9009   359             1               -.903472E+04                    *9010
*9010   360             1               0.507642E+05
DMIG    *VTAIL          361             1                               *9011
*9011   357             1               -.131707E+02                    *9012
*9012   358             1               0.315215E+03                    *9013
*9013   359             1               -.103102E+04                    *9014
*9014   360             1               -.504458E+04                    *9015
*9015   361             1               0.468148E+05
DMIG    *VTAIL          362             1                               *9016
*9016   357             1               0.739752E+00                    *9017
*9017   358             1               -.313943E+02                    *9018
*9018   359             1               0.841453E+02                    *9019
*9019   360             1               0.764191E+02                    *9020
*9020   361             1               -.117072E+05                    *9021
*9021   362             1               0.484915E+05
DMIG    *VTAIL          363             1                               *9022
*9022   357             1               0.363626E+00                    *9023
*9023   358             1               -.206621E+01                    *9024
*9024   359             1               0.170371E+02                    *9025
*9025   360             1               -.128679E+03                    *9026
*9026   361             1               0.142936E+04                    *9027
*9027   362             1               -.141053E+05                    *9028
*9028   363             1               0.334950E+05
DMIG    *VTAIL          364             1                               *9029
*9029   357             1               -.178665E+00                    *9030
*9030   358             1               0.286879E+01                    *9031
*9031   359             1               -.179730E+02                    *9032
*9032   360             1               0.822153E+02                    *9033
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*9033   361          1          -.308830E+03   *9034
*9034   362          1          0.163581E+04   *9035
*9035   363          1          -.934300E+04   *9036
*9036   364          1          0.133364E+05
DMIG    *VTAIL       367        1              *9037
*9037   357          1          0.156429E+04   *9038
*9038   358          1          -.126722E+05   *9039
*9039   359          1          -.249630E+02   *9040
*9040   360          1          0.252357E+03   *9041
*9041   361          1          0.220342E+02   *9042
*9042   362          1          -.348368E+01   *9043
*9043   363          1          0.213553E-02   *9044
*9044   364          1          0.287588E+00   *9045
*9045   367          1          0.573159E+05
DMIG    *VTAIL       368        1              *9046
*9046   357          1          0.150006E+03   *9047
*9047   358          1          -.349447E+04   *9048
*9048   359          1          -.184666E+05   *9049
*9049   360          1          -.597411E+03   *9050
*9050   361          1          0.413201E+03   *9051
*9051   362          1          -.489800E+02   *9052
*9052   363          1          -.271009E+00   *9053
*9053   364          1          -.202789E+01   *9054
*9054   367          1          -.502776E+04   *9055
*9055   368          1          0.246725E+05
DMIG    *VTAIL       369        1              *9056
*9056   357          1          0.292477E+03   *9057
*9057   358          1          0.106678E+04   *9058
*9058   359          1          -.372974E+04   *9059
*9059   360          1          -.163066E+05   *9060
*9060   361          1          -.720338E+03   *9061
*9061   362          1          0.400484E+03   *9062
*9062   363          1          0.516836E+00   *9063
*9063   364          1          -.141972E+02   *9064
*9064   367          1          0.245134E+03   *9065
*9065   368          1          -.625047E+04   *9066
*9066   369          1          0.208907E+05
DMIG    *VTAIL       370        1              *9067
*9067   357          1          0.109520E+02   *9068
*9068   358          1          -.429165E+02   *9069
*9069   359          1          0.371999E+03   *9070
*9070   360          1          -.238343E+04   *9071
*9071   361          1          -.147446E+05   *9072
*9072   362          1          0.690143E+03   *9073
*9073   363          1          0.723676E+03   *9074
*9074   364          1          0.244021E+02   *9075
*9075   367          1          -.574195E+02   *9076
*9076   368          1          0.416297E+03   *9077
*9077   369          1          -.416404E+04   *9078
*9078   370          1          0.182966E+05
DMIG    *VTAIL       371        1              *9079
*9079   357          1          -.319898E+00   *9080
*9080   358          1          -.105520E+02   *9081
*9081   359          1          0.537074E+02   *9082
*9082   360          1          0.115046E+03   *9083
*9083   361          1          -.455381E+03   *9084
*9084   362          1          -.131301E+05   *9085
*9085   363          1          0.208463E+04   *9086
*9086   364          1          -.271085E+03   *9087
*9087   367          1          0.123231E+02   *9088
*9088   368          1          -.234544E+03   *9089
*9089   369          1          0.874696E+03   *9090
*9090   370          1          -.744486E+04   *9091
*9091   371          1          0.300624E+05
DMIG    *VTAIL       372        1              *9092
*9092   357          1          0.463602E+00   *9093
*9093   358          1          -.677371E+01   *9094
*9094   359          1          -.134083E+02   *9095
*9095   360          1          0.577641E+02   *9096
*9096   361          1          0.669330E+02   *9097
*9097   362          1          -.915742E+03   *9098
*9098   363          1          -.544593E+04   *9099
*9099   364          1          0.116824E+04   *9100
*9100   367          1          -.794538E+01   *9101
*9101   368          1          0.789193E+02   *9102
*9102   369          1          -.316023E+03   *9103
*9103   370          1          0.187626E+04   *9104
*9104   371          1          -.192798E+05   *9105
*9105   372          1          0.276338E+05
DMIG    *VTAIL       373        1              *9106
*9106   357          1          0.484957E-02   *9107
*9107   358          1          0.440965E+00   *9108
*9108   359          1          -.691597E+00   *9109
*9109   360          1          -.875753E+00   *9110
*9110   361          1          0.363362E+02   *9111
*9111   362          1          0.411035E+01   *9112
*9112   363          1          -.163347E+04   *9113
*9113   364          1          -.258823E+04   *9114
*9114   367          1          0.345739E+00   *9115
*9115   368          1          -.422117E+01   *9116
*9116   369          1          0.101714E+02   *9117
*9117   370          1          -.633944E+02   *9118
*9118   371          1          0.270474E+04   *9119
*9119   372          1          -.730833E+04   *9120
*9120   373          1          0.703131E+04
DMIG    *VTAIL       375        1              *9121
*9121   357          1          -.230046E+04   *9122
*9122   358          1          -.497159E+05   *9123
*9123   359          1          0.157355E+04   *9124
*9124   360          1          0.126726E+04   *9125
*9125   361          1          0.195618E+03   *9126
*9126   362          1          -.247898E+02   *9127
*9127   363          1          0.635440E+01   *9128
*9128   364          1          -.784751E+00   *9129
*9129   367          1          0.378804E+03   *9130
*9130   368          1          -.142639E+04   *9131
*9131   369          1          0.123205E+04   *9132
*9132   370          1          0.216183E+03   *9133
*9133   371          1          -.467290E+02   *9134
*9134   372          1          0.428324E+01   *9135
*9135   373          1          -.914807E+00   *9136
*9136   375          1          0.925573E+06
DMIG    *VTAIL       376        1              *9137
*9137   357          1          0.922286E+03   *9138
*9138   358          1          0.349061E+04   *9139
*9139   359          1          -.272521E+05   *9140
*9140   360          1          0.153243E+04   *9141
*9141   361          1          0.667605E+03   *9142
*9142   362          1          -.740884E+01   *9143
*9143   363          1          -.243058E+02   *9144
*9144   364          1          0.583973E+00   *9145
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*9146   368          1          0.129929E+04   *9147
*9147   369          1          0.235053E+04   *9148
*9148   370          1          0.756407E+03   *9149
*9149   371          1          0.771059E+02   *9150
*9150   372          1          -.600606E+00   *9151
*9151   373          1          0.197780E+01   *9152
*9152   375          1          -.311505E+05   *9153
*9153   376          1          0.109246E+06
DMIG    *VTAIL       377        1              *9154
*9154   357          1          0.317443E+03   *9155
*9155   358          1          0.219380E+04   *9156
*9156   359          1          0.208271E+04   *9157
*9157   360          1          -.279276E+05   *9158
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*9159   362          1          0.550257E+03   *9160
*9160   363          1          0.811533E+02   *9161
*9161   364          1          -.211053E+00   *9162
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*9163   368          1          0.171546E+04   *9164
*9164   369          1          0.884905E+03   *9165
*9165   370          1          0.158823E+04   *9166
*9166   371          1          0.561757E+03   *9167
*9167   372          1          0.690199E+02   *9168
*9168   373          1          0.714289E+01   *9169
*9169   375          1          0.363833E+04   *9170
*9170   376          1          -.187741E+05   *9171
*9171   377          1          0.775901E+05
DMIG    *VTAIL       378        1              *9172
*9172   357          1          -.110646E+02   *9173
*9173   358          1          0.133390E+03   *9174
*9174   359          1          0.711357E+03   *9175
*9175   360          1          0.202839E+04   *9176
*9176   361          1          -.261682E+05   *9177
*9177   362          1          0.139574E+04   *9178
*9178   363          1          0.872899E+03   *9179
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*9181   368          1          0.487425E+03   *9182
*9182   369          1          0.121023E+04   *9183
*9183   370          1          0.188910E+04   *9184
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*9185   372          1          0.265625E+03   *9186
*9186   373          1          0.127903E+03   *9187
*9187   375          1          -.234087E+03   *9188
*9188   376          1          0.178520E+04   *9189
*9189   377          1          -.113866E+05   *9190
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DMIG    *VTAIL       379        1              *9191
*9191   357          1          0.555097E+00   *9192
*9192   358          1          -.383492E+02   *9193
*9193   359          1          0.749947E+02   *9194
*9194   360          1          0.542347E+03   *9195
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*9198   364          1          0.100000E+04   *9199
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*9201   369          1          0.450535E+03   *9202
*9202   370          1          0.123586E+04   *9203
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*9209   378          1          -.143803E+05   *9210
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DMIG    *VTAIL       380        1              *9211
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*9212   358          1          0.121017E+01   *9213
*9213   359          1          -.388187E+01   *9214
*9214   360          1          0.424170E+02   *9215
*9215   361          1          0.491571E+03   *9216
*9216   362          1          0.156462E+04   *9217
*9217   363          1          -.188062E+05   *9218
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*9221   369          1          0.222733E+02   *9222
*9222   370          1          0.254233E+03   *9223
*9223   371          1          0.570111E+03   *9224
*9224   372          1          0.211878E+04   *9225
*9225   373          1          0.303574E+03   *9226
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DMIG    *VTAIL       381        1              *9232
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*9237   362          1          0.467089E+02   *9238
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DMIG    *VTAIL       382              1                           *9254
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*9264   369          1                0.135616E+00                *9265
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*9266   371          1                0.122064E+02                *9267
*9267   372          1                0.882424E+01                *9268
*9268   373          1                -.479232E+02                *9269
*9269   375          1                0.117696E+00                *9270
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*9271   377          1                0.991771E+00                *9272
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*9273   379          1                -.139387E+03                *9274
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DMIG    *VTAIL       383              1                           *9277
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*9297   380          1                0.131850E+04                *9298
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*9313   371          1                0.485381E+02                *9314
*9314   372          1                -.926415E+01                *9315
*9315   373          1                -.122039E+01                *9316
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DMIG    *VTAIL       385              1                           *9326
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*9349   383          1                -.714582E-02                *9350
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*9384   362          1                -.905881E-03                *9385
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*9403   384          1                -.178513E+03                *9404
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DMIG    *VTAIL       389              1                           *9436
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*9475   390          1               -.160803E+04                 *9476
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+2440A  1.      .0000001
PBAR    2441    2       100.0   100.0   .00001  .001            +2441
+2441                                                            +2441A
+2441A  1.      .0000001
PBAR    2442    2       100.0   100.0   .00001  .001            +2442
+2442                                                            +2442A
+2442A  1.      .0000001
PBAR    2443    2       100.0   100.0   .00001  .001            +2443
+2443                                                            +2443A
+2443A  1.      .0000001
PBAR    2444    2       100.0   100.0   .00001  .001            +2444
+2444                                                            +2444A
+2444A  1.      .0000001
PBAR    2445    2       100.0   100.0   .00001  .001            +2445
+2445                                                            +2445A
+2445A  1.      .0000001
PBAR    2446    2       100.0   100.0   .00001  .001            +2446
+2446                                                            +2446A
+2446A  1.      .0000001
PBAR    2447    2       100.0   100.0   .00001  .001            +2447
+2447                                                            +2447A
+2447A  1.      .0000001
PBAR    2448    2       100.0   100.0   .00001  .001            +2448
+2448                                                            +2448A
+2448A  1.      .0000001
PBAR    2449    2       100.0   100.0   .00001  .001            +2449
+2449                                                            +2449A
+2449A  1.      .0000001
PBAR    2450    2       100.0   100.0   .00001  .001            +2450
+2450                                                            +2450A
+2450A  1.      .0000001
PBAR    2451    2       100.0   100.0   .00001  .001            +2451
+2451                                                            +2451A
+2451A  1.      .0000001
PBAR    2452    2       100.0   100.0   .00001  .001            +2452
+2452                                                            +2452A
+2452A  1.      .0000001
PBAR    2453    2       100.0   100.0   .00001  .001            +2453
+2453                                                            +2453A
+2453A  1.      .0000001
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PBAR    2454    2       100.0   100.0   .00001  .001                    +2454
+2454                                                                   +2454A
+2454A  1.      .0000001
PBAR    2455    2       100.0   100.0   .00001  .001                    +2455
+2455                                                                   +2455A
+2455A  1.      .0000001
PBAR    2456    2       100.0   100.0   .00001  .001                    +2456
+2456                                                                   +2456A
+2456A  1.      .0000001
PBAR    2457    2       100.0   100.0   .00001  .001                    +2457
+2457                                                                   +2457A
+2457A  1.      .0000001
PBAR    2458    2       100.0   100.0   .00001  .001                    +2458
+2458                                                                   +2458A
+2458A  1.      .0000001
PBAR    2459    2       100.0   100.0   .00001  .001                    +2459
+2459                                                                   +2459A
+2459A  1.      .0000001
PBAR    2460    2       100.0   100.0   .00001  .001                    +2460
+2460                                                                   +2460A
+2460A  1.      .0000001
PBAR    3502    2       10000.  99990.  99990.  99990.
PBEAM   1       2       .690    480.000 371.450         .001            +1
+1      NO      1.0             593.000 547.400                         +1A
+1A     0.      1.
PBEAM   2       2       .690    593.000 547.400         .001            +2
+2      NO      1.0             736.000 606.050                         +2A
+2A     0.      1.
PBEAM   3       2       4.140   896.000 655.500         640.            +3
+3      NO      1.0             912.000 656.500                         +3A
+3A     0.      1.
PBEAM   4       2       4.140   912.000 656.500         2175.           +4
+4      NO      1.0             3104.0001780.000                        +4A
+4A     0.      1.
PBEAM   5       2       4.140   3104.0001780.000        2770.           +5
+5      NO      1.0             6240.0003625.000                        +5A
+5A     0.      1.
PBEAM   6       2       3.600   8000.0004245.000        5250.           +6
+6      NO      1.0             7900.0004430.000                        +6A
+6A     0.      1.
PBEAM   7       2       1980.0007900.0004430.000        5250.           +7
+7      NO      1.0             8100.0004170.000                        +7A
+7A     0.      1.
PBEAM   8       2       1980.0008100.0004170.000        5250.           +8
+8      NO      1.0             9400.0003900.000                        +8A
+8A     0.      1.
PBEAM   9       2       1980.0009400.0003900.000        5250.           +9
+9      NO      1.0             9400.0003887.062                        +9A
+9A     0.      1.
PBEAM   10      2       1980.0009400.0003887.062        5250.           +10
+10     NO      1.0             10100.003670.000                        +10A
+10A    0.      1.
PBEAM   11      2       1980.00010100.003670.000        5250.           +11
+11     NO      1.0             1000.0003691.000                        +11A
+11A    0.      1.
PBEAM   12      2       1980.0001000.0003691.000        5250.           +12
+12     NO      1.0             9600.0003700.000                        +12A
+12A    0.      1.
PBEAM   13      2       1980.0009600.0003700.000        5250.           +13
+13     NO      1.0             8750.0003780.000                        +13A
+13A    0.      1.
PBEAM   14      2       1980.0008750.0003780.000        5250.           +14
+14     NO      1.0             8123.6303590.000                        +14A
+14A    0.      1.
PBEAM   15      2       1980.0008123.6303590.000        5250.           +15
+15     NO      1.0             7200.0003340.000                        +15A
+15A    0.      1.
PBEAM   16      2       1980.0007200.0003340.000        5067.5          +16
+16     NO      1.0             6425.0001872.000                        +16A
+16A    0.      1.
PBEAM   17      2       1980.0006425.0  1872.00         4910.0          +17
+17     NO      1.0     1980.0006375.0  1791.00                         +17A
+17A    0.      1.              .0000
PBEAM   18      2       1980.0006375.0  1791.00         4725.0          +18
+18     NO      1.0     1980.0006200.0  1470.00                         +18A
+18A    0.      1.              .0000
PBEAM   19      2       1980.0006200.0  1470.00         4515.0          +19
+19     NO      1.0     1980.0006900.0  1374.00                         +19A
+19A    0.      1.              .0000
PBEAM   20      2       1980.0006900.0  1374.00         4375.5          +20
+20     NO      1.0     1980.0008250.0  1167.00                         +20A
+20A    0.      1.              .0000
PBEAM   21      2       1980.0008250.0  1167.00         4147.5          +21
+21     NO      1.0     1980.0008250.0  960.00                          +21A
+21A    0.      1.              .0000
PBEAM   22      2       1.      8250.000960.00          3885.           +22
+22     NO      1.0             8250.000                                +22A
+22A    0.      0.
PBEAM   31      2       200.000 9999.0  99999.00        .01             +31
+31     NO      1.0     197.000                                         +31A
PBEAM   32      2       200.000 9999.0  99999.00        .01             +32
+32     NO      1.0     200.000                                         +32A
PBEAM   33      2       200.000 9999.0  99999.00        .01             +33
+33     NO      1.0     207.000                                         +33A
PBEAM   34      2       200.000 9999.0  99999.00        .01             +34
+34     NO      1.0     215.000                                         +34A
PBEAM   35      2       200.000 9999.0  99999.00        .01             +35
+35     NO      1.0     219.000                                         +35A
PBEAM   36      2       200.000 9999.0  99999.00        .01             +36
+36     NO      1.0     222.000                                         +36A
PBEAM   37      2       1980.0009999.0  9999.00         .01             +37
+37     NO      1.0     1188.000                                        +37A
PBEAM   38      2       1.970   9999.0  251.45          .01             +38
+38     NO      1.0     .950            49.35                           +38A
PBEAM   39      2       4.140   9999.0  323.80                          +39
+39     NO      1.0     2.140           123.20                          +39A
PBEAM   40      2       4.140   9999.0  284.10                          +40
+40     NO      1.0     2.180           140.90                          +40A
PBEAM   41      2       5.590   9999.0  376.40                          +41
+41     NO      1.0     2.834           124.70                          +41A
PBEAM   42      2       3.942   9999.0  379.30                          +42
+42     NO      1.0     2.088           112.40                          +42A
PBEAM   43      2       2.886   9999.0  350.15                          +43
+43     NO      1.0     2.340           293.75                          +43A
PBEAM   44      2       2.340   9999.0  293.75                          +44
+44     NO      1.0     1.430           99.875                          +44A
PBEAM   45      2       1.430   9999.0  99.875          .001            +45
+45     NO      1.0     1.521           76.375                          +45A
PBEAM   46      2       2.250   9999.0  215.00          .001            +46
+46     NO      1.0     2.250           162.00                          +46A
PBEAM   47      2       2.250   9999.0  162.00                          +47
+47     NO      1.0     1.875           133.00                          +47A
PBEAM   48      2       1.875   9999.0  133.00                          +48
+48     NO      1.0     2.250           46.00                           +48A
PBEAM   49      2       1.256   1.      41.26           .001            +49
+49     NO      1.0     1.354           51.57                           +49A
+49A    0.      1.              -.1188
PBEAM   50      2       1.354   1.      51.57                           +50
+50     NO      1.0     1.371           53.59                           +50A
+50A    0.      1.              -.0185
PBEAM   51      2       1.371   1.      53.59                           +51
+51     NO      1.0     1.371           53.59                           +51A
+51A    0.      1.              .0000
PBEAM   52      2       1.371   1.      53.59                           +52
+52     NO      1.0     1.534           60.14                           +52A
+52A    0.      1.              -.0622
PBEAM   53      2       1.534   1.      60.14           .001            +53
+53     NO      1.0     1.547           62.03                           +53A
+53A    0.      1.              -.0086
PBEAM   54      2       .942    1.      37.54           .001            +54
+54     NO      1.0     1.449           76.22                           +54A
+54A    0.      1.              -.4242
PBEAM   55      2       1089.0001.      9999.00         .001            +55
+55     NO      1.0     1980.000        9999.00                         +55A
+55A    0.      1.              .0000
PBEAM   56      2       1980.0001.      9999.00         .001            +56
+56     NO      1.0     1485.000        9999.00                         +56A
+56A    0.      1.              .0000
PBEAM   57      2       1.440   .001    .001            .001            +57
+57     NO      1.0     1.440                                           +57A
+57A    0.      1.              .0000
PBEAM   141     2       2.380   1.      46.34           .001            +141
+141    NO      1.0     2.520           52.89                           +141A
+141A   0.      1.              -.0571
PBEAM   142     2       2.520   1.      52.89           .001            +142
+142    NO      1.0     2.660           60.54                           +142A
+142A   0.      1.              -.0541
PBEAM   143     2       2.660   1.      54.50           .001            +143
+143    NO      1.0     2.800           61.49                           +143A
+143A   0.      1.              -.0513
PBEAM   144     2       2.800   1.      61.49           .001            +144
+144    NO      1.0     3.080           76.54                           +144A
+144A   0.      1.              -.0952
PBEAM   145     2       3.080   1.      76.54           .001            +145
+145    NO      1.0     3.080           76.54                           +145A
+145A   0.      1.              .0000
PBEAM   146     2       .990    1.      44.68           .001            +146
+146    NO      1.0     1.017           47.44                           +146A
+146A   0.      1.              -.0269
PBEAM   147     2       1.017   1.      34.25           .001            +147
+147    NO      1.0     1.620           103.19                          +147A
+147A   0.      1.              -.4573
PBEAM   148     2       1.500   1.      24.08           .001            +148
+148    NO      1.0     1.875           39.37                           +148A
+148A   0.      1.              -.2222
PBEAM   149     2       1.875   1.      39.37           .001            +149
+149    NO      1.0     2.250           59.52                           +149A
+149A   0.      1.              -.1818
PBEAM   150     2       1.125   1.      44.13           .001            +150
+150    NO      1.0     1.538           87.37                           +150A
+150A   0.      1.              -.3099
PBEAM   151     2       1.538   1.      86.52           .001            +151
+151    NO      1.0     1.750           115.17                          +151A
+151A   0.      1.              -.1293
PBEAM   152     2       1.750   1.      115.17          .001            +152
+152    NO      1.0     1.750           115.17                          +152A
+152A   0.      1.              .0000
PBEAM   153     2       14.000  1.      129.80          .001            +153
+153    NO      1.0     14.000          129.80                          +153A
+153A   0.      1.              .0000
PBEAM   154     2       14.000  1.      79.18           .001            +154
+154    NO      1.0     18.000          130.90                          +154A
+154A   0.      1.              -.2500
PBEAM   160     2       30.000  .001    .001            .001            +160
+160    NO      1.0     30.000                                          +160A
+160A   0.      1.              .0000
PBEAM   161     2       1980.0001.      9999.00         .001            +161
+161    NO      1.0     2970.000        9999.00                         +161A
+161A   0.      1.              .0000
PBEAM   162     2       2970.0001.      9999.00         .001            +162
+162    NO      1.0     1782.000        47.10                           +162A
+162A   0.      1.              .0000
PBEAM   163     2       1.080   1.      121.33          .001            +163
+163    NO      1.0     1.080           99.73                           +163A
+163A   0.      1.              .0000
PBEAM   164     2       1980.0001.      9999.00         .001            +164
+164    NO      1.0     2970.000        9999.00                         +164A
+164A   0.      1.              .0000
PBEAM   165     2       2970.0001.      9999.00         .001            +165
+165    NO      1.0     1980.000        9999.00                         +165A
+165A   0.      1.              .0000
PBEAM   166     2       .840    1.      181.16          .001            +166
+166    NO      1.0     .678            115.24                          +166A
+166A   0.      1.              .2134
PBEAM   167     2       1980.0001.      9999.00         .001            +167
+167    NO      1.0     1980.000        9999.00                         +167A
+167A   0.      1.              .0000
PBEAM   168     2       1.400   1.      239.03          .001            +168
+168    NO      1.0     1.100           139.10                          +168A
+168A   0.      1.              .2400
PBEAM   169     2       4.200   1.      20.00           .001            +169
+169    NO      1.0     3.210           20.00                           +169A
+169A   0.      1.              .0000
PBEAM   170     2       3.210   1.      20.00           .001            +170
+170    NO      1.0     3.300           20.00                           +170A
+170A   0.      1.              .0000
PBEAM   171     2       1980.0001.      9999.00         .001            +171
+171    NO      1.0     1980.000        9999.00                         +171A
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+171A   0.      1.              .0000
PBEAM   172     2       1.230   1.      84.87           .001    +172
+172    NO      1.0     1.000           57.12                   +172A
+172A   0.      1.              .2063
PBEAM   173     2       1.125   1.      41.92           .001    +173
+173    NO      1.0     1.188           46.53                   +173A
+173A   0.      1.              -.0541
PBEAM   174     2       .750    1.      12.63           .001    +174
+174    NO      1.0     1.063           23.78                   +174A
+174A   0.      1.              -.3448
PBEAM   175     2       1059.3001.      9999.00         .001    +175
+175    NO      1.0     841.500         9999.00                 +175A
+175A   0.      1.              .0000
PBEAM   176     2       75.000  1.      2.98            .001    +176
+176    NO      1.0     79.000          12.10                   +176A
+176A   0.      1.              .0000
PBEAM   177     2       79.000  1.      12.10           .001    +177
+177    NO      1.0     82.000          29.71                   +177A
+177A   0.      1.              .0000
PBEAM   178     2       82.000  1.      29.71           .001    +178
+178    NO      1.0     85.000          29.71                   +178A
+178A   0.      1.              .0000
PBEAM   179     2       85.000  9999.0  46.06           .001    +179
+179    NO      1.0     90.000
PBEAM   180     2       90.000  9999.0  46.06           .001    +180
+180    NO      1.0     55.800          31.90
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+181    NO      1.0
PBEAM   182     2       990.000 1.      9999.00         .001    +182
+182    NO      1.0
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+1001   NO      1.      1.32951         14.209                  +1001A
+1001A  0.      1.              1.36-2
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+1002   NO      1.      1.23648         13.640                  +1002A
+1002A  0.      1.              7.25-2
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+1003   NO      1.      1.09137         12.836                  +1003A
+1003A  0.      1.              .125
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+1004   NO      1.      0.85176         11.727                  +1004A
+1004A  0.      1.              .247
PBEAM   1005    2       0.85176 1.      11.727                  +1005
+1005   NO      1.      0.57309         10.782                  +1005A
+1005A  0.      1.              .391
PBEAM   1007    2       0.5201  1.      4.137                   +1007
+1007   NO      1.      0.5704          4.188                   +1007A
+1007A  0.      1.              -9.23-2
PBEAM   1009    2       0.05068 1.      7.4                     +1009
+1009   NO      1.      0.05704                                 +1009A
+1009A  0.      1.              -.118
PBEAM   1010    2       0.68448 1.      11.387                  +1010
+1010   NO      1.      0.65988         10.584                  +1010A
+1010A  0.      1.              3.66-2
PBEAM   1011    2       0.65988 1.      3.834                   +1011
+1011   NO      1.      0.58224         3.781                   +1011A
+1011A  0.      1.              .125
PBEAM   1012    2       0.4852  1.      2.985                   +1012
+1012   NO      1.      0.3817          3.085                   +1012A
+1012A  0.      1.              .239
PBEAM   1013    2       0.3817  1.      4.113                   +1013
+1013   NO      1.      0.2527          3.779                   +1013A
+1013A  0.      1.              .407
PBEAM   1014    2       1.1795  1.      32.608                  +1014
+1014   NO      1.      1.24325         37.764                  +1014A
+1014A  0.      1.              -5.26-2
PBEAM   1015    2       1.24325 1.      35.291                  +1015
+1015   NO      1.      1.26225         36.787                  +1015A
+1015A  0.      1.              -1.52-2
PBEAM   1016    2       1.0098  1.      36.787                  +1016
+1016   NO      1.      0.897           28.514                  +1016A
+1016A  0.      1.              .118
PBEAM   1017    2       0.897   1.      28.514                  +1017
+1017   NO      1.      0.7106          17.378                  +1017A
+1017A  0.      1.              .232
PBEAM   1018    2       0.88825 1.      17.378                  +1018
+1018   NO      1.      0.569           7.448                   +1018A
+1018A  0.      1.              .438
PBEAM   1020    2       .174168 1.      2.924                   +1020
+1020   NO      1.      .192741         3.774                   +1020A
+1020A  0.      1.              -.101
PBEAM   1022    2       .004037 1.      8.0                     +1022
+1022   NO      1.      .004701         3.                      +1022A
+1022A  0.      1.              -.152
PBEAM   1023    2       .192741 1.      3.774                   +1023
+1023   NO      1.      .173225         1.931                   +1023A
+1023A  0.      1.              .107
PBEAM   1024    2       .173225 1.      1.931                   +1024
+1024   NO      1.      .137473         .991                    +1024A
+1024A  0.      1.              .230
PBEAM   1025    2       .137473 1.      .991                    +1025
+1025   NO      1.      .085198         4.751                   +1025A
+1025A  0.      1.              .870
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+1026   NO      1.      0.56896         4.995                   +1026A
+1026A  0.      1.              -6.48-2
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+1027   NO      1.      .93792          4.858                   +1027A
+1027A  0.      1.              3.91-2
PBEAM   1028    2       0.54712 1.      4.858                   +1028
+1028   NO      1.      0.43652         2.292                   +1028A
+1028A  0.      1.              .225
PBEAM   1029    2       0.12472 1.      2.292                   +1029
+1029   NO      1.      0.07392         .998                    +1029A
+1029A  0.      1.              .511
PBEAM   1031    2       .602006 1.      12.135                  +1031
+1031   NO      1.      .638206         13.539                  +1031A
+1031A  0.      1.              -5.84-2
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+1033A  0.      1.              -7.53-2
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+1035A  0.      1.              .270
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+1036   NO      1.      .208421         2.466                   +1036A
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PBEAM   1037    2       0.0864  1.      .140                    +1037
+1037   NO      1.      0.06364         .0759                   +1037A
+1037A  0.      1.              .303
PBEAM   1038    2       0.54612 1.      5.551                   +1038
+1038   NO      1.      0.58212         5.807                   +1038A
+1038A  0.      1.              -6.38-2
PBEAM   1039    2       0.19404 1.      4.814                   +1039
+1039   NO      1.      0.15936         2.212                   +1039A
+1039A  0.      1.              .196
PBEAM   1040    2       0.15936 1.      2.212                   +1040
+1040   NO      1.      0.1296          .140                    +1040A
+1040A  0.      1.              .206
PBEAM   1041    2       0.216   1.      .233                    +1041
+1041   NO      1.      0.1411          .0995                   +1041A
+1041A  0.      1.              .419
PBEAM   1043    2       .1148   1.      .239                    +1043
+1043   NO      1.      .118531         .255                    +1043A
+1043A  0.      1.              -3.20-2
PBEAM   1045    2       0.02716 1.      3.2                     +1045
+1045   NO      1.      0.02891         0.119                   +1045A
+1045A  0.      1.              -6.24-2
PBEAM   1046    2       .118531 1.      .255                    +1046
+1046   NO      1.      .103033         .193                    +1046A
+1046A  0.      1.              .140
PBEAM   1047    2       0.02568 1.      0.001                   +1047
+1047   NO      1.      0.02513                                 +1047A
+1047A  0.      1.              2.16-2
PBEAM   1048    2       .103033 1.      .193                    +1048
+1048   NO      1.      .082328         .123                    +1048A
+1048A  0.      1.              .223
PBEAM   1049    2       .082328 1.      .637                    +1049
+1049   NO      1.      0.05289         .953                    +1049A
+1049A  0.      1.              .435
PBEAM   1050    2       12.9    1.      .952                    +1050
+1050   NO      1.      2.9             .15                     +1050A
+1050A  0.      1.              1.266
PBEAM   1051    2       0.41616 1.      4.768                   +1051
+1051   NO      1.      0.39888         4.214                   +1051A
+1051A  0.      1.              4.24-2
PBEAM   1052    2       0.28808 1.      3.968                   +1052
+1052   NO      1.      0.22399         2.323                   +1052A
+1052A  0.      1.              .250
PBEAM   1053    2       0.22399 1.      2.323                   +1053
+1053   NO      1.      0.13195         .877                    +1053A
+1053A  0.      1.              .517
PBEAM   1054    2       10.15   1.      1.104                   +1054
+1054   NO      1.      2.3             .15                     +1054A
+1054A  0.      1.              1.261
PBEAM   1056    2       0.0772  1.      .112                    +1056
+1056   NO      1.      .07868          .116                    +1056A
+1056A  0.      1.              -1.90-2
PBEAM   1057    2       0.07868 1.      .116                    +1057
+1057   NO      1.      0.06116         .0701                   +1057A
+1057A  0.      1.              .251
PBEAM   1058    2       0.06116 1.      .587                    +1058
+1058   NO      1.      .0332           .173                    +1058A
+1058A  0.      1.              .593
PBEAM   1059    2       8.3     1.      .173                    +1059
+1059   NO      1.      1.8             .15                     +1059A
+1059A  0.      1.              1.287
PBEAM   1060    2       0.6004  1.      1.874           3.      +1060
+1060   NO      1.      0.513           1.073                   +1060A
+1060A  0.      1.              .157
PBEAM   1061    2       0.513   1.      1.073           2.      +1061
+1061   NO      1.      .2508           .265                    +1061A
+1061A  0.      1.              .687
PBEAM   1062    2       6.6     1.      .249                    +1062
+1062   NO      1.      1.5             .15                     +1062A
+1062A  0.      1.              1.259
PBEAM   1071    2       .563180 1.      30.125                  +1071
+1071   NO      1.      .456388         12.840                  +1071A
+1071A  0.      1.              .209
PBEAM   1072    2       .682631 1.      8.277                   +1072
+1072   NO      1.      .665175         7.859                   +1072A
+1072A  0.      1.              2.59-2
PBEAM   1073    2       .554312 1.      7.859                   +1073
+1073   NO      1.      .515704         6.811                   +1073A
+1073A  0.      1.              7.15-2
PBEAM   1074    2       .58975  1.      14.868                  +1074
+1074   NO      1.      .531            6.135                   +1074A
+1074A  0.      1.              .105
PBEAM   1075    2       .675834 1.      32.711                  +1075
+1075   NO      1.      .608902         25.555                  +1075A
+1075A  0.      1.              .104
PBEAM   1076    2       .74152  1.      3.66                    +1076
+1076   NO      1.      .64649          10.312                  +1076A
+1076A  0.      1.              .137
PBEAM   1077    2       0.59676 1.      12.691                  +1077
+1077   NO      1.      0.50976         2.256                   +1077A
+1077A  0.      1.              .157
PBEAM   1078    2       .531    1.      6.135                   +1078
+1078   NO      1.      .504625         5.541                   +1078A
+1078A  0.      1.              5.09-2
PBEAM   1079    2       0.52481 1.      5.541                   +1079
+1079   NO      1.      0.49517         4.933                   +1079A
+1079A  0.      1.              5.81-2
PBEAM   1080    2       0.41899 1.      4.933                   +1080
+1080   NO      1.      0.36586         6.161                   +1080A
+1080A  0.      1.              .135
PBEAM   1081    2       .902630 1.      30.774                  +1081
+1081   NO      1.      .842997         31.687                  +1081A
+1081A  0.      1.              6.83-2
PBEAM   1082    2       .756112 1.      9.525                   +1082
+1082   NO      1.      .694238         19.190                  +1082A
+1082A  0.      1.              8.53-2
PBEAM   1083    2       0.90882 1.      14.949                  +1083
+1083   NO      1.      0.84618         2.210                   +1083A
+1083A  0.      1.              7.14-2
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PBEAM   1084    2       0.9402  1.      2.762                   +1084
+1084   NO      1.      0.8128          2.065                   +1084A
+1084A  0.      1.              .145
PBEAM   1085    2       0.48768 1.      2.242                   +1085
+1085   NO      1.      0.39912         2.251                   +1085A
+1085A  0.      1.              .200
PBEAM   1086    2       0.73172 1.      4.425                   +1086
+1086   NO      1.      0.7194          4.277                   +1086A
+1086A  0.      1.              1.70-2
PBEAM   1087    2       0.7194  1.      4.277                   +1087
+1087   NO      1.      0.66748         3.682                   +1087A
+1087A  0.      1.              7.49-2
PBEAM   1088    2       0.48544 1.      3.682                   +1088
+1088   NO      1.      0.448           3.136                   +1088A
+1088A  0.      1.              8.02-2
PBEAM   1089    2       0.616   1.      3.136                   +1089
+1089   NO      1.      0.59752         2.951                   +1089A
+1089A  0.      1.              3.05-2
PBEAM   1090    2       0.59752 1.      3.319                   +1090
+1090   NO      1.      0.56496         2.968                   +1090A
+1090A  0.      1.              5.60-2
PBEAM   1091    2       .964044 1.      26.163                  +1091
+1091   NO      1.      .900046         33.946                  +1091A
+1091A  0.      1.              6.87-2
PBEAM   1092    2       .80058  1.      8.240                   +1092
+1092   NO      1.      .740025         7.040                   +1092A
+1092A  0.      1.              7.86-2
PBEAM   1093    2       0.9867  1.      3.017                   +1093
+1093   NO      1.      0.9295          2.678                   +1093A
+1093A  0.      1.              5.97-2
PBEAM   1094    2       0.7605  1.      2.231                   +1094
+1094   NO      1.      0.70344         1.909                   +1094A
+1094A  0.      1.              7.80-2
PBEAM   1095    2       0.62528 1.      2.245                   +1095
+1095   NO      1.      0.56416         5.554                   +1095A
+1095A  0.      1.              .103
PBEAM   1096    2       1.12832 1.      3.720                   +1096
+1096   NO      1.      1.03488         3.138                   +1096A
+1096A  0.      1.              8.64-2
PBEAM   1097    2       0.58212 1.      .9936                   +1097
+1097   NO      1.      0.52038         .794                    +1097A
+1097A  0.      1.              .112
PBEAM   1098    2       0.46256 1.      .878                    +1098
+1098   NO      1.      0.41088         .692                    +1098A
+1098A  0.      1.              .118
PBEAM   1099    2       0.56496 1.      2.968                   +1099
+1099   NO      1.      0.50864         3.405                   +1099A
+1099A  0.      1.              .105
PBEAM   1100    2       0.32368 1.      2.951                   +1100
+1100   NO      1.      0.2702          1.360                   +1100A
+1100A  0.      1.              .180
PBEAM   1101    2       0.2895  1.      1.434                   +1101
+1101   NO      1.      0.237           1.561                   +1101A
+1101A  0.      1.              .199
PBEAM   1102    2       .803494 1.      19.105                  +1102
+1102   NO      1.      .756148         18.318                  +1102A
+1102A  0.      1.              6.07-2
PBEAM   1103    2       .868368 1.      3.7                     +1103
+1103   NO      1.      .808308         3.656                   +1103A
+1103A  0.      1.              7.16-2
PBEAM   1104    2       0.56848 1.      7.616                   +1104
+1104   NO      1.      0.53648         2.977                   +1104A
+1104A  0.      1.              5.79-2
PBEAM   1105    2       0.53648 1.      1.985                   +1105
+1105   NO      1.      0.49888         2.015                   +1105A
+1105A  0.      1.              7.26-2
PBEAM   1106    2       0.49888 1.      2.217                   +1106
+1106   NO      1.      0.4536          2.014                   +1106A
+1106A  0.      1.              9.51-2
PBEAM   1107    2       0.70875 1.      2.009                   +1107
+1107   NO      1.      0.664           1.764                   +1107A
+1107A  0.      1.              6.52-2
PBEAM   1108    2       0.3984  1.      .670                    +1108
+1108   NO      1.      0.37695         .600                    +1108A
+1108A  0.      1.              5.53-2
PBEAM   1109    2       0.37695 1.      .600                    +1109
+1109   NO      1.      0.3324          1.367                   +1109A
+1109A  0.      1.              .126
PBEAM   1110    2       0.35456 1.      1.367                   +1110
+1110   NO      1.      0.31472         .368                    +1110A
+1110A  0.      1.              .119
PBEAM   1111    2       0.15736 1.      .242                    +1111
+1111   NO      1.      0.1264          1.156                   +1111A
+1111A  0.      1.              .218
PBEAM   1112    2       0.1728  1.      .303                    +1112
+1112   NO      1.      0.16064         .262                    +1112A
+1112A  0.      1.              7.29-2
PBEAM   1113    2       0.16064 1.      .222                    +1113
+1113   NO      1.      0.13784         .163                    +1113A
+1113A  0.      1.              .153
PBEAM   1114    2       0.13784 1.      .148                    +1114
+1114   NO      1.      0.12232         .117                    +1114A
+1114A  0.      1.              .119
PBEAM   1115    2       0.12232 1.      .117                    +1115
+1115   NO      1.      0.108           .991                    +1115A
+1115A  0.      1.              .124
PBEAM   1116    2       .337714 1.      19.909                  +1116
+1116   NO      1.      .312716         19.868                  +1116A
+1116A  0.      1.              7.69-2
PBEAM   1117    2       0.85918 1.      3.590                   +1117
+1117   NO      1.      0.77384         3.626                   +1117A
+1117A  0.      1.              .105
PBEAM   1118    2       0.54624 1.      6.20                    +1118
+1118   NO      1.      0.49872         2.937                   +1118A
+1118A  0.      1.              9.10-2
PBEAM   1119    2       0.39482 1.      1.371                   +1119
+1119   NO      1.      0.35112         1.197                   +1119A
+1119A  0.      1.              .117
PBEAM   1120    2       0.31416 1.      1.796                   +1120
+1120   NO      1.      0.27047         1.622                   +1120A
+1120A  0.      1.              .149
PBEAM   1121    2       0.36593 1.      .570                    +1121
+1121   NO      1.      0.32453         .448                    +1121A
+1121A  0.      1.              .120

PBEAM   1122    2       0.23987 1.      .388                    +1122
+1122   NO      1.      0.2193          .324                    +1122A
+1122A  0.      1.              8.96-2
PBEAM   1123    2       2.193   1.      0.577                   +1123
+1123   NO      1.      1.7255          0.319                   +1123A
+1123A  0.      1.              .239
PBEAM   1124    2       1.7255  .1      0.319                   +1124
+1124   NO      1.      1.411           0.186                   +1124A
+1124A  0.      1.              .201
PBEAM   1125    2       1.411   1.      0.186                   +1125
+1125   NO      1.      1.122           0.37                    +1125A
+1125A  0.      1.              .228
PBEAM   1126    2       0.290   1.      .15                     +1126
+1126   NO      1.      0.230                                   +1126A
+1126A  0.      1.              .231
PBEAM   1127    2       0.230   1.      .15                     +1127
+1127   NO      1.      0.180                                   +1127A
+1127A  0.      1.              .244
PBEAM   1128    2       0.180   1.      .15                     +1126
+1128   NO      1.      0.150                                   +1128A
+1128A  0.      1.              .182
PBEAM   1131    2       24.900  1.      2.334                   +1131
+1131   NO      1.0     41.600          4.497                   +1131A
+1131A  0.      1.              -.502
PBEAM   1132    2       22.300  1.      1.258                   +1132
+1132   NO      1.0     43.800          6.091                   +1132A
+1132A  0.      1.              -.651
PBEAM   1133    2       43.800  1.      6.091           .001    +1133
+1133   NO      1.0     46.400          8.843                   +1133A
+1133A  0.      1.              -.058
PBEAM   1134    2       46.4    100.    13.5            10.     +1134
+1134   NO      1.      50.68                                   +1134A
+1134A  0.      1.              -8.82-2
PBEAM   1135    2       20.300  1.      1.601                   +1135
+1135   NO      1.0     39.600          5.214                   +1135A
+1135A  0.      1.              -.644
PBEAM   1136    2       17.900  1.      1.469                   +1136
+1136   NO      1.0     35.300          4.849                   +1136A
+1136A  0.      1.              -.654
PBEAM   1137    2       35.300  1.      4.849           .001    +1137
+1137   NO      1.0     39.910          7.360                   +1137A
+1137A  0.      1.              -.123
PBEAM   1138    2       39.91   100.    10.5            10.     +1138
+1138   NO      1.      40.37                                   +1138A
+1138A  0.      1.              -1.15-2
PBEAM   1139    2       15.900  1.      1.286                   +1139
+1139   NO      1.0     31.800          4.283                   +1139A
+1139A  0.      1.              -.667
PBEAM   1140    2       14.000  1.      .836                    +1140
+1140   NO      1.0     28.200          2.827                   +1140A
+1140A  0.      1.              -.673
PBEAM   1141    2       28.200  1.      2.827           .001    +1141
+1141   NO      1.0     32.160          4.634                   +1141A
+1141A  0.      1.              -.131
PBEAM   1142    2       32.16   100.    7.94            10.     +1142
+1142   NO      1.      32.70                                   +1142A
+1142A  0.      1.              -1.67-2
PBEAM   1143    2       12.800  1.      .537                    +1143
+1143   NO      1.0     26.050          1.860                   +1143A
+1143A  0.      1.              -.682
PBEAM   1144    2       11.190  1.      .541                    +1144
+1144   NO      1.0     23.000          1.894                   +1144A
+1144A  0.      1.              -.691
PBEAM   1145    2       23.000  1.      1.894           .001    +1145
+1145   NO      1.0     25.560          3.414                   +1145A
+1145A  0.      1.              -.105
PBEAM   1146    2       25.56   100.    6.5             10.     +1146
+1146   NO      1.      27.16                                   +1146A
+1146A  0.      1.              -6.070-2
PBEAM   1147    2       9.060   1.      .492                    +1147
+1147   NO      1.0     19.800          1.700                   +1147A
+1147A  0.      1.              -.744
PBEAM   1148    2       7.640   1.      .210                    +1148
+1148   NO      1.0     17.500          .929                    +1148A
+1148A  0.      1.              -.784
PBEAM   1149    2       17.500  1.      .929            .001    +1149
+1149   NO      1.0     18.620          1.942                   +1149A
+1149A  0.      1.              -.062
PBEAM   1150    2       18.62   100.    4.32            10.     +1150
+1150   NO      1.      19.3                                    +1150A
+1150A  0.      1.              -3.59-2
PBEAM   1151    2       7.100   1.      .042                    +1151
+1151   NO      1.0     16.900          .269                    +1151A
+1151A  0.      1.              -.817
PBEAM   1152    2       22.300  1.      1.150                   +1152
+1152   NO      1.0     24.900          1.440                   +1152A
+1152A  0.      1.              -.110
PBEAM   1153    2       20.300  1.      .870                    +1153
+1153   NO      1.0     22.300          1.150                   +1153A
+1153A  0.      1.              -.094
PBEAM   1154    2       17.900  1.      .630                    +1154
+1154   NO      1.0     20.300          .870                    +1154A
+1154A  0.      1.              -.126
PBEAM   1155    2       15.900  1.      .470                    +1155
+1155   NO      1.0     17.900          .630                    +1155A
+1155A  0.      1.              -.118
PBEAM   1156    2       14.000  1.      .340                    +1156
+1156   NO      1.0     15.900          .470                    +1156A
+1156A  0.      1.              -.127
PBEAM   1157    2       12.800  1.      .260                    +1157
+1157   NO      1.0     14.000          .340                    +1157A
+1157A  0.      1.              -.090
PBEAM   1158    2       11.190  1.      .280                    +1158
+1158   NO      1.0     12.800          .260                    +1158A
+1158A  0.      1.              -.134
PBEAM   1159    2       9.060   1.      .260                    +1159
+1159   NO      1.0     11.190          .280                    +1159A
+1159A  0.      1.              -.210
PBEAM   1160    2       7.640   1.      .170                    +1160
+1160   NO      1.0     9.060           .260                    +1160A
+1160A  0.      1.              -.170
PBEAM   1161    2       7.100   1.      .120                    +1161
+1161   NO      1.0     7.640           .170                    +1161A
+1161A  0.      1.              -.073
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PBEAM   1162    2       43.800  1.      5.189                   +1162
+1162   NO      1.0     41.600          5.636                   +1162A
+1162A  0.      1.              .052
PBEAM   1163    2       39.600  1.      4.049                   +1163
+1163   NO      1.0     43.800          5.170                   +1163A
+1163A  0.      1.              -.101
PBEAM   1164    2       35.300  1.      3.053                   +1164
+1164   NO      1.0     39.600          4.049                   +1164A
+1164A  0.      1.              -.115
PBEAM   1165    2       31.800  1.      2.364                   +1165
+1165   NO      1.0     35.300          3.040                   +1165A
+1165A  0.      1.              -.104
PBEAM   1166    2       28.200  1.      1.762                   +1166
+1166   NO      1.0     31.800          2.354                   +1166A
+1166A  0.      1.              -.120
PBEAM   1167    2       26.050  1.      1.444                   +1167
+1167   NO      1.0     28.200          1.754                   +1167A
+1167A  0.      1.              -.079
PBEAM   1168    2       23.000  1.      1.274                   +1168
+1168   NO      1.0     26.050          1.431                   +1168A
+1168A  0.      1.              -.124
PBEAM   1169    2       19.800  1.      1.019                   +1169
+1169   NO      1.0     23.000          1.269                   +1169A
+1169A  0.      1.              -.150
PBEAM   1170    2       17.500  1.      .706                    +1170
+1170   NO      1.0     19.800          1.007                   +1170A
+1170A  0.      1.              -.123
PBEAM   1171    2       16.900  1.      .588                    +1171
+1171   NO      1.0     17.500          .709                    +1171A
+1171A  0.      1.              -.035
PBEAM   1181    2       0.341   100.    4.328           .001    +1181
+1181   NO      1.      1.0025          10.953                  +1181A
+1181A  0.      1.              -.984
PBEAM   1182    2       1.604   1.      75.00000        .265    +1182
+1182   NO      1.0     1.365           70.00000                +1182A
+1182A  0.      1.              .1611
PBEAM   1183    2       68.240  1.      70.00000        .265    +1183
+1183   NO      1.0     53.180          18.30000                +1183A
+1183A  0.      1.              .2481
PBEAM   1184    2       1.064   1.      18.30000        .265    +1184
+1184   NO      1.0     .715            5.30000                 +1184A
+1184A  0.      1.              .3923
PBEAM   1185    2       .715    1.      5.30000         .265    +1185
+1185   NO      1.0     .370            .65000                  +1185A
+1185A  0.      1.              .6362
PBEAM   1186    2       22.130  1.      7.00000         .265    +1186
+1186   NO      1.0     21.000          7.00000                 +1186A
+1186A  0.      1.              .0524
PBEAM   1187    2       21.000  1.      7.00000         .265    +1187
+1187   NO      1.0     16.200          .95000                  +1187A
+1187A  0.      1.              .2581
PBEAM   1188    2       16.200  1.      .95000          .265    +1188
+1188   NO      1.0     10.900          .30000                  +1188A
+1188A  0.      1.              .3911
PBEAM   1189    2       10.900  1.      .30000          .265    +1189
+1189   NO      1.0     5.690           .04000                  +1189A
+1189A  0.      1.              .6281
PBEAM   1190    2       3.414   100.    1.1             .001    +1190
+1190   NO      1.      2.802           1.0                     +1190A
+1190A  0.      1.              .197
PBEAM   1191    2       18.680  1.      5.80000         .265    +1191
+1191   NO      1.0     18.680          5.80000                 +1191A
+1191A  0.      1.              .0000
PBEAM   1192    2       18.680  1.      5.80000         .265    +1192
+1192   NO      1.0     14.740          .28300                  +1192A
+1192A  0.      1.              .2358
PBEAM   1193    2       14.740  1.      .28300          .265    +1193
+1193   NO      1.0     9.990           .09600                  +1193A
+1193A  0.      1.              .3841
PBEAM   1194    2       9.990   1.      .09600          .265    +1194
+1194   NO      1.0     5.250           .01400                  +1194A
+1194A  0.      1.              .6220
PBEAM   1195    2       35.960  1.      5.14100         .265    +1195
+1195   NO      1.0     33.740          5.13000                 +1195A
+1195A  0.      1.              .0637
PBEAM   1196    2       33.740  1.      5.13000         .265    +1196
+1196   NO      1.0     26.740          .22400                  +1196A
+1196A  0.      1.              .2315
PBEAM   1197    2       26.740  1.      .22400          .265    +1197
+1197   NO      1.0     18.100          .07510                  +1197A
+1197A  0.      1.              .3854
PBEAM   1198    2       18.100  1.      .07510          .265    +1198
+1198   NO      1.0     9.500           .01143                  +1198A
+1198A  0.      1.              .6232
PBEAM   1199    2       0.924   100.    0.32            .001    +1199
+1199   NO      1.      0.7535          0.25                    +1199A
+1199A  0.      1.              .203
PBEAM   1200    2       15.070  1.      3.20000         .265    +1200
+1200   NO      1.0     15.070          3.20000                 +1200A
+1200A  0.      1.              .0000
PBEAM   1201    2       15.070  1.      3.20000         .265    +1201
+1201   NO      1.0     13.370          .17300                  +1201A
+1201A  0.      1.              .1195
PBEAM   1202    2       13.370  1.      .17300          .265    +1202
+1202   NO      1.0     8.120           .05600                  +1202A
+1202A  0.      1.              .4886
PBEAM   1203    2       8.120   1.      .05600          .265    +1203
+1203   NO      1.0     4.260           .00880                  +1203A
+1203A  0.      1.              .6236
PBEAM   1204    2       15.940  1.      2.00000         .265    +1204
+1204   NO      1.0     13.940          2.00000                 +1204A
+1204A  0.      1.              .1339
PBEAM   1205    2       13.940  1.      2.00000         .265    +1205
+1205   NO      1.0     11.130          .10800                  +1205A
+1205A  0.      1.              .2242
PBEAM   1206    2       11.130  1.      .10800          .265    +1206
+1206   NO      1.0     7.530           .03700                  +1206A
+1206A  0.      1.              .3859
PBEAM   1207    2       7.530   1.      .03700          .265    +1207
+1207   NO      1.0     3.950           .00580                  +1207A
+1207A  0.      1.              .6237
PBEAM   1208    2       12.820  1.      1.20000         .265    +1208
+1208   NO      1.0     12.820          1.20000                 +1208A
+1208A  0.      1.              .0000

PBEAM   1209    2       12.820  1.      1.20000         .265    +1209
+1209   NO      1.0     10.280          .07100                  +1209A
+1209A  0.      1.              .2199
PBEAM   1210    2       10.280  1.      .07100          .265    +1210
+1210   NO      1.0     6.960           .02500                  +1210A
+1210A  0.      1.              .3852
PBEAM   1211    2       6.960   1.      .02500          .265    +1211
+1211   NO      1.0     3.640           .00370                  +1211A
+1211A  0.      1.              .6264
PBEAM   1212    2       0.7055  100.    0.32            .001    +1212
+1212   NO      1.      0.63            0.25                    +1212A
+1212A  0.      1.              .113
PBEAM   1213    2       12.600  1.      .70000          .265    +1213
+1213   NO      1.0     11.690          .70000                  +1213A
+1213A  0.      1.              .0749
PBEAM   1214    2       11.690  1.      .70000          .265    +1214
+1214   NO      1.0     9.420           .05530                  +1214A
+1214A  0.      1.              .2151
PBEAM   1215    2       9.420   1.      .05530          .265    +1215
+1215   NO      1.0     6.360           .01900                  +1215A
+1215A  0.      1.              .3878
PBEAM   1216    2       6.360   1.      .01900          .265    +1216
+1216   NO      1.0     3.330           .00290                  +1216A
+1216A  0.      1.              .6254
PBEAM   1217    2       11.400  1.      .40000          .265    +1217
+1217   NO      1.0     10.620          .40000                  +1217A
+1217A  0.      1.              .0708
PBEAM   1218    2       10.620  1.      .40000          .265    +1218
+1218   NO      1.0     8.570           .01970                  +1218A
+1218A  0.      1.              .2137
PBEAM   1219    2       8.570   1.      .01970          .265    +1219
+1219   NO      1.0     5.750           .00760                  +1219A
+1219A  0.      1.              .3939
PBEAM   1220    2       5.750   1.      .00760          .265    +1220
+1220   NO      1.0     2.990           .00130                  +1220A
+1220A  0.      1.              .6316
PBEAM   1231    2       .189    1.      2.20872         3.000   +1231
+1231   NO      1.0     .614            25.02095                +1231A
+1231A  0.      1.              -1.0587
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+1232   NO      1.0     .315            2.20872                 +1232A
+1232A  0.      1.              -.1169
PBEAM   1233    2       .152    1.      1.15839         .900    +1233
+1233   NO      1.0     .168            1.42177                 +1233A
+1233A  0.      1.              -.1018
PBEAM   1234    2       .226    1.      .74641          .700    +1234
+1234   NO      1.0     .253            .93783                  +1234A
+1234A  0.      1.              -.1127
PBEAM   1235    2       .125    1.      .55802          .400    +1235
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+1235A  0.      1.              -.0779
PBEAM   1236    2       .115    1.      .40738          .300    +1236
+1236   NO      1.0     .125            .48321                  +1236A
+1236A  0.      1.              -.0837
PBEAM   1237    2       .175    1.      .28956          .150    +1237
+1237   NO      1.0     .192            .34903                  +1237A
+1237A  0.      1.              -.0922
PBEAM   1238    2       .096    1.      .20137          .075    +1238
+1238   NO      1.0     .105            .24515                  +1238A
+1238A  0.      1.              -.0959
PBEAM   1241    2       16.200  1.      .01850          3.000   +1241
+1241   NO      1.0     53.180          .26000                  +1241A
+1241A  0.      1.              -1.0660
PBEAM   1242    2       14.740  1.      .01400          2.000   +1242
+1242   NO      1.0     16.200          .01850                  +1242A
+1242A  0.      1.              -.0944
PBEAM   1243    2       13.370  1.      .00940          .900    +1243
+1243   NO      1.0     14.740          .01400                  +1243A
+1243A  0.      1.              -.0975
PBEAM   1244    2       13.370  1.      .00690          .700    +1244
+1244   NO      1.0     13.370          .00940                  +1244A
+1244A  0.      1.              .0000
PBEAM   1245    2       11.130  1.      .00450          .400    +1245
+1245   NO      1.0     13.370          .00690                  +1245A
+1245A  0.      1.              -.1829
PBEAM   1246    2       10.280  1.      .00330          .300    +1246
+1246   NO      1.0     11.130          .00450                  +1246A
+1246A  0.      1.              -.0794
PBEAM   1247    2       9.420   1.      .00210          .150    +1247
+1247   NO      1.0     10.280          .00330                  +1247A
+1247A  0.      1.              -.0873
PBEAM   1248    2       8.570   1.      .00150          .075    +1248
+1248   NO      1.0     9.420           .00210                  +1248A
+1248A  0.      1.              -.0945
PBEAM   1251    2       10.900  1.      .00604          3.000   +1251
+1251   NO      1.0     35.740          .08200                  +1251A
+1251A  0.      1.              -1.0652
PBEAM   1252    2       9.990   1.      .00460          2.000   +1252
+1252   NO      1.0     10.900          .00604                  +1252A
+1252A  0.      1.              -.0871
PBEAM   1253    2       9.050   1.      .00315          .900    +1253
+1253   NO      1.0     9.990           .00460                  +1253A
+1253A  0.      1.              -.0987
PBEAM   1254    2       8.120   1.      .00232          .700    +1254
+1254   NO      1.0     9.050           .00315                  +1254A
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PBEAM   1255    2       7.530   1.      .00149          .400    +1255
+1255   NO      1.0     8.120           .00232                  +1255A
+1255A  0.      1.              -.0754
PBEAM   1256    2       6.960   1.      .00112          .300    +1256
+1256   NO      1.0     7.530           .00149                  +1256A
+1256A  0.      1.              -.0787
PBEAM   1257    2       6.360   1.      .00074          .150    +1257
+1257   NO      1.0     6.960           .00112                  +1257A
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+1258   NO      1.0     6.360           .00074                  +1258A
+1258A  0.      1.              -.1007
PBEAM   1261    2       5.690   1.      .00089          3.000   +1261
+1261   NO      1.0     18.490          .01210                  +1261A
+1261A  0.      1.              -1.0587
PBEAM   1262    2       5.250   1.      .00068          2.000   +1262
+1262   NO      1.0     5.690           .00089                  +1262A
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+1264   NO      1.0     4.750           .00047                          +1264A
+1264A  0.      1.              -.1088
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+1265   NO      1.0     4.260           .00035                          +1265A
+1265A  0.      1.              -.0755
PBEAM   1266    2       3.640   1.      .00017          .300            +1266
+1266   NO      1.0     3.950           .00023                          +1266A
+1266A  0.      1.              -.0817
PBEAM   1267    2       3.330   1.      .00011          .150            +1267
+1267   NO      1.0     3.640           .00017                          +1267A
+1267A  0.      1.              -.0890
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+1268   NO      1.0     3.330           .00011                          +1268A
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+2002   NO      1.      5574.4201.      37.000
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+2003   NO      1.      3618.9001.      18.660
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+2004   NO      1.      1663.3351.      .320
PBEAM   2005    2       1429.5691.      1.290           .001            +2005
+2005   NO      1.      3214.8001.      10.645
PBEAM   2006    2       3214.8001.      10.645          .001            +2006
+2006   NO      1.      4999.9951.      20.000
PBEAM   2007    2       4999.9951.      20.000          .001            +2007
+2007   NO      1.      3331.6651.      11.600
PBEAM   2008    2       3331.6651.      11.600          .001            +2008
+2008   NO      1.      1663.3351.      3.200
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+2009   NO      1.      2357.6401.      .485
PBEAM   2010    2       2357.6401.      .485            .001            +2010
+2010   NO      1.      3597.3991.      .200
PBEAM   2011    2       3597.3991.      .200            .001            +2011
+2011   NO      1.      2467.5301.      .650
PBEAM   2012    2       2467.5301.      .650            .001            +2012
+2012   NO      1.      1337.6611.      1.100
PBEAM   2013    2       859.140 1.      .294            .001            +2013
+2013   NO      1.      1864.8001.      .247
PBEAM   2014    2       1864.8001.      .247            .001            +2014
+2014   NO      1.      2870.5271.      .200
PBEAM   2015    2       2870.5271.      .200            .001            +2015
+2015   NO      1.      1965.2331.      .470
PBEAM   2016    2       1965.2331.      .470            .001            +2016
+2016   NO      1.      1059.9391.      .740
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+2017   NO      1.      1398.2001.      .104
PBEAM   2018    2       1398.2001.      .104            .001            +2018
+2018   NO      1.      2178.8191.      .100
PBEAM   2019    2       2178.8151.      .100            .001            +2019
+2019   NO      1.      1488.0001.      .120
PBEAM   2020    2       1488.0001.      .120            .001            +2020
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PBEAM   2021    2       454.845 1.      .100            .001            +2021
+2021   NO      1.      832.800 1.      .110
PBEAM   2022    2       832.800 1.      .110            .001            +2022
+2022   NO      1.      1210.7881.      .120
PBEAM   2023    2       1210.7881.      .120            .001            +2023
+2023   NO      1.      852.600 1.      .126
PBEAM   2024    2       852.600 1.      .126            .001            +2024
+2024   NO      1.      494.505 1.      .131
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PBEAM   2036    2       98.900  1.      .714            .001            +2036
+2036   NO      1.      85.914  1.      .490
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+2039   NO      1.      53.600  1.      .205
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+2040   NO      1.      45.484  1.      .110
PBEAM   2041    2       557.442 1.      61.000          .001            +2041
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+2047   NO      1.      252.500 1.      .860
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+3026P  NO      1.      4.92                                            +3026PA
+3026PA 0.      1.              -0.887
PBEAM   3027    2       0.3     1000.   10.             .001            +3027P
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PBEAM   3028    2       22.     1000.   10.             .001            +3028P
+3028P  NO      1.      41.                                             +3028PA
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PBEAM   3029    2       22.     1000.   10.             .001            +3029P
+3029P  NO      1.
PBEAM   3030    2       41.     1000.   10.             .001            +3030P
+3030P  NO      1.
PBEAM   3031    2       41.     1000.   10.             .001            +3031P
+3031P  NO      1.
PBEAM   3032    2       41.     1000.   10.             0.              +3032P
+3032P  NO      1.
PBEAM   3081    2       23.11   999.    .01             .01             +3081P
+3081P  NO      1.      100.                                            +3081PA
+3081PA                 -1.249
PBEAM   3082    2       100.    999.    .01             .01             +3082P
+3082P  NO      1.      22.11                                           +3082PA
+3082PA                 1.276
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+3083PA 1.      .001
PBEAM   3085    2       100.    999.    .01             .01             +3085P
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+3085PA 1.      .001
PBEAM   3087    2       22.     .001    26.89           .001            +3087P
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PSHEAR  76      2       .055812
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PSHEAR  202     1       .1570
PSHEAR  203     1       .1347
PSHEAR  204     1       .01775
PSHEAR  642     2       .0382
PSHEAR  646     2       .0382
PSHEAR  650     2       .0382
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PSHEAR  652     1       .042
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PSHEAR  654     1       .04225
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RBAR    3422    3205    186     123456                  123
RBAR    3423    3201    3204    123456                  5
RBAR    3424    3204    3207    123456                  3
RBAR    3425    3208    3212    123456                  3
RBAR    3426    3208    3209    123456                  123
SPC1    3       1       359     360     361     362     364     367
SPC1    3       1       368     369     370     371     373     381
SPC1    3       1       383     384     385     386     387     389
SPC1    3       1       390     391     392     393     408
SPC1    3       156     36      42      50      437     59      431
SPC1    3       156     71      84      298     286     117     285
SPC1    3       156     163     164     153     154     155     156
SPC1    3       156     267     268     458     459
SPC1    3       156     283     284     282     281     405
SPC1    4       234     36      42      50      437     59      431
SPC1    4       234     71      84      298     286     117     285
SPC1    4       234     163     164     153     154     155     156
SPC1    4       234     267     268     458     459
SPC1    4       234     283     284     282     281     405
SPC1    5       4       3022
SPC1    5       4       3047
SPC1    5       456     251     256     261     262     266
SPC1    5       456     1001    1002    1003    1004    1005    1006
SPC1    5       456     1007    1008    1010    1012    1014    1016
SPC1    5       456     1018    1173    1174    1175    1176    1177
SPC1    5       456     1019    THRU    1027
SPC1    5       456     1029    1030    1032    1033    1038    1039
SPC1    5       456     1031    1034    1037    1040    1045    1048
SPC1    5       456     1044    1046    1047    1051    1052    1053
SPC1    5       456     1054    1057    1066    1069    1079    1082
SPC1    5       456     1055    1056    1060    1061    1062    1063
SPC1    5       456     1064    1065    1067    1068    1072    1073
SPC1    5       456     1074    1075    1076    1077    1078    1080
SPC1    5       456     1079    1114    1275    1276    1280    1290
SPC1    5       456     1081    1085    1086    1087    1088
SPC1    5       456     1094    1114    1121
SPC1    5       456     1096    1097    1098    1099    1100    1101
SPC1    5       456     1102    1103    1104    1105    1106    1107
SPC1    5       456     1108    1109    1110    1111    1112    1113
```

```
SPC1    5       456     1125    1126    1127
SPC1    5       456     1128    1129    1130    1131    1132    1133
SPC1    5       456     1134    1135    1136    1137    1138    1139
SPC1    5       456     1140    1141    1142
SPC1    5       456     1143
SPC1    5       456     1178    1179    1180    1194
SPC1    5       456     1181    THRU    1193
SPC1    5       456     1233    2233
SPC1    5       456     1242    1243    1244    1245
SPC1    5       456     1251    THRU    1266
SPC1    5       456     1292    1293    1464    1465    1466    1467
SPC1    5       456     1501    THRU    1526
SPC1    5       456     2001    2002    2003    2004    2005    2006
SPC1    5       456     2007    2008    2010    2012    2014    2016
SPC1    5       456     2018    2173    2174    2175    2176    2177
SPC1    5       456     2019    THRU    2027
SPC1    5       456     2029    2030    2032    2033    2038    2039
SPC1    5       456     2031    2034    2037    2040    2045    2048
SPC1    5       456     2044    2046    2047    2051    2052    2053
SPC1    5       456     2054    2057    2066    2069    2079    2082
SPC1    5       456     2055    2056    2060    2061    2062    2063
SPC1    5       456     2064    2065    2067    2068    2072    2073
SPC1    5       456     2074    2075    2076    2077    2078    2080
SPC1    5       456     2079    2114    2275    2276    2280    2290
SPC1    5       456     2081    2085    2086    2087    2088
SPC1    5       456     2094    2114    2121
SPC1    5       456     2096    2097    2098    2099    2100    2101
SPC1    5       456     2102    2103    2104    2105    2106    2107
SPC1    5       456     2108    2109    2110    2111    2112    2113
SPC1    5       456     2125    2126    2127
SPC1    5       456     2128    2129    2130    2131    2132    2133
SPC1    5       456     2134    2135    2136    2137    2138    2139
SPC1    5       456     2140    2141    2142
SPC1    5       456     2143
SPC1    5       456     2178    2179    2180    2194
SPC1    5       456     2181    THRU    2193
SPC1    5       456     2242    2243    2244    2245
SPC1    5       456     2251    THRU    2266
SPC1    5       456     2292    2293    2464    2465    2466    2467
SPC1    5       456     2501    THRU    2526
SPC1    5       456     3063    3064    3065    3066
SPC1    5       456     3067    3068    3069    3070
SPC1    5       123456  701     702     703
SPCADD  1       3       5
SPCADD  2       4       5
SUPORT  42      156
ENDDATA
```

Appendix C.
Structural Finite Element Data for Nontypical LCO Case

```
ID LMTAS BLOCK 40 F-16 FLUTTER FEM NONTYPICAL LCO CASE
SOL 103
TIME 20
$
CEND
$
TITLE=F-16 1/2 AIRPLANE FINITE ELEMENT MODEL FOR FLUTTER ANALYSIS
SUBTI=ANTI-SYMMETRIC CENTERLINE BOUNDARY CONDITIONS // FULL XWING FUEL
LABEL=CONFIG 5 = MA41
DISP=ALL
ECHO=SORT
$ DMIG VERTICAL TAIL STIFFNESS MATRIX
K2GG=VTAIL
$ EIGENVALUE EXTRACTION
METHOD=1
$ SYMMETRIC B.C. / SPC=2 FOR ANTISYMMETRIC
SPC=2
$
$ SET 203022=GRIDS USED IN FLUTTER ANALYSIS.
$ ADD GRIDS 801 THROUGH 814 FOR DYNAMIC RESPONSE.
$
SET 203022=   2,   3,   4,   5,   6,
              9,  11,  13,  15,  17,
             19,  20,  21,  26,  29,
             33,  39,  44,  47,  51,
             52,  53,  56,  60,  61,
             62,  64,  65,  68,  72,
             73,  74,  75,  77,  78,
             81,  85,  86,  87,  89,
             90,  91,  92,  93,  95,
            102, 103, 104, 105, 106,
            107, 108, 109, 110, 111,
            112, 113, 122, 123, 124,
            128, 129, 130, 131, 132,
            133,3004,3006,3009       $ AIM-9/16S200 OR 16S200 ON TIP
$
$ GENERATE BUT DO NOT PRINT-
$  EIGENVECTORS FOR FLUTTER ANALYSIS
$
$ PRINT-
$ A-SET EIGENVECTORS FOR INSPECTION
$
OUTPUT(PLOT)
CSCALE=1.8
PAPER SIZE=26. BY 20.
$
$ SET 10=ELEMENTS USED IN MODE PLOTS
$
$ FUSELAGE CENTERLINE
SET 10=   1 THRU   26,
$ WING BOX
       1001 THRU 1005,
       1007,1010 THRU 1013,
       1020,1023 THRU 1025,
       1031,1034,1036,1043,1045,
       1046,1048 THRU 1054,
       1056 THRU 1062,
       1071 THRU 1074,
       1078,1079,1080,
       1086 THRU 1090,
       1099,1100,1101,
       1075,1076,1077,
       1081 THRU 1085,
       1091 THRU 1097,
       1102 THRU 1111,
       1116 THRU 1125,
       1126,1127,1128,
$ LEADING EDGE FLAP / 1258 ACTUATOR
       1131 THRU 1134,
       1136,1137,1138,
       1140,1141,1142,
       1144,1145,1146,
       1148 THRU 1151,
       1152 THRU 1171,
$ FLAPERON
       1181 THRU 1185,
       1187 THRU 1189,
       1190 THRU 1194,
       1196 THRU 1203,
       1205 THRU 1207,
       1209 THRU 1220,
       1231 THRU 1238,
       1251 THRU 1258,
       1261 THRU 1268,
$ HORIZONTAL TAIL
       2001 THRU 2058,
$ VERTICAL TAIL
       2401 THRU 2460,
$ 16S200 // STATION 1,9
       3003 THRU 3009,
$ AIM-9L // STATION 1,9
       3014,3015
$
MAXIMUM DEFORMATION 35.
AXES MX,MY,Z
VIEW 60.0,30.,0.
FIND SCALE ORIGIN 10 SET 10
PLOT MODAL DEFO 0 SET 10 ORIGIN 10
$
$
BEGIN BULK
ASET    3500    123456
ASET    3501    123456
```

```
ASET1   1       163     153     154     155     156     71      286
ASET1   1       267
ASET1   1       284     281
ASET1   1       367     408     368     359     384
ASET1   1       373     364     381     383
ASET1   1       386     391     371     362     387     392     393
ASET1   1       389     369     360     385     390     370     361
ASET1   1       410
ASET1   1       3080    3082    3085
ASET1   1       3207    3210    3211    3213
ASET1   2       3079    3083
ASET1   2       3206    3212
ASET1   3       6       17      5       15      4       13      3
ASET1   3       11      2       9
ASET1   3       19      72      20      60      73      21      61
ASET1   3       39      47      56      68      81
ASET1   3       74      51      62      75      26      52      64
ASET1   3       77      29      44      53      65      78      33
ASET1   3       85      86      87      88
ASET1   3       90      103     109     89      102     108
ASET1   3       95      107     113     93      106     112     124
ASET1   3       130     133     92      105     111     123     129
ASET1   3       132     91      104     110     122     128     131
ASET1   3       233
ASET1   3       251     THRU    266
ASET1   3       3002    3004    3006    3009
ASET1   3       3076    3080    3081    3085
ASET1   3       3204    3210    3211    3213
ASET1   4       3204    3211
ASET1   5       153     154     155     156     71      286     284
ASET1   5       410
ASET1   5       459
ASET1   5       3211
ASET1   6       437     281     410
ASET1   6       458
ASET1   6       3207    3211
ASET1   123456  3088
CBAR    27      27      284     410     1.      1.      0.
CBAR    2401    2401    407     367     0.      1.      1.
CBAR    2402    2402    367     368     0.      1.      1.
CBAR    2403    2403    368     369     0.      1.      1.
CBAR    2404    2404    369     370     0.      1.      1.
CBAR    2405    2405    370     371     0.      1.      1.
CBAR    2406    2406    371     372     0.      1.      1.
CBAR    2407    2407    372     373     0.      1.      1.
CBAR    2408    2408    357     358     0.      1.      1.
CBAR    2409    2409    358     359     0.      1.      1.
CBAR    2410    2410    359     360     0.      1.      1.
CBAR    2411    2411    360     361     0.      1.      1.
CBAR    2412    2412    361     362     0.      1.      1.
CBAR    2413    2413    362     363     0.      1.      1.
CBAR    2414    2414    363     364     0.      1.      1.
CBAR    2415    2415    409     375     0.      1.      1.
CBAR    2416    2416    375     376     0.      1.      1.
CBAR    2417    2417    376     377     0.      1.      1.
CBAR    2418    2418    377     378     0.      1.      1.
CBAR    2419    2419    378     379     0.      1.      1.
CBAR    2420    2420    379     380     0.      1.      1.
CBAR    2421    2421    380     381     0.      1.      1.
CBAR    2422    2422    382     383     0.      1.      1.
CBAR    2423    2423    384     385     0.      1.      1.
CBAR    2424    2424    385     386     0.      1.      1.
CBAR    2425    2425    386     387     0.      1.      1.
CBAR    2426    2426    387     388     0.      1.      1.
CBAR    2427    2427    389     390     0.      1.      1.
CBAR    2428    2428    390     391     0.      1.      1.
CBAR    2429    2429    391     392     0.      1.      1.
CBAR    2430    2430    392     393     0.      1.      1.
CBAR    2431    2431    407     357     0.      1.      1.
CBAR    2432    2432    357     409     0.      1.      1.
CBAR    2433    2433    367     358     0.      1.      1.
CBAR    2434    2434    358     375     0.      1.      1.
CBAR    2435    2435    375     384     0.      1.      1.
CBAR    2436    2436    375     406     0.      1.      1.
CBAR    2437    2437    406     408     0.      1.      1.
CBAR    2438    2438    368     359     0.      1.      1.
CBAR    2439    2439    359     376     0.      1.      1.
CBAR    2440    2440    376     384     0.      1.      1.
CBAR    2441    2441    369     360     0.      1.      1.
CBAR    2442    2442    360     377     0.      1.      1.
CBAR    2443    2443    377     385     0.      1.      1.
CBAR    2444    2444    370     361     0.      1.      1.
CBAR    2445    2445    361     378     0.      1.      1.
CBAR    2446    2446    378     386     0.      1.      1.
CBAR    2447    2447    371     362     0.      1.      1.
CBAR    2448    2448    362     379     0.      1.      1.
CBAR    2449    2449    372     363     0.      1.      1.
CBAR    2450    2450    363     380     0.      1.      1.
CBAR    2451    2451    380     382     0.      1.      1.
CBAR    2452    2452    380     388     0.      1.      1.
CBAR    2453    2453    373     364     0.      1.      1.
CBAR    2454    2454    364     381     0.      1.      1.
CBAR    2455    2455    381     383     0.      1.      1.
CBAR    2456    2456    384     389     0.      1.      1.
CBAR    2457    2457    385     390     0.      1.      1.
CBAR    2458    2458    386     391     0.      1.      1.
CBAR    2459    2459    387     392     0.      1.      1.
CBAR    2460    2460    388     393     0.      1.      1.
CBAR    3502    3502    3500    52      1.      1.      0.
CBAR    3503    3502    3501    52      1.      1.      0.
CBEAM   1       1       163     164     1.      0.      0.
CBEAM   2       2       164     153     1.      0.      0.
CBEAM   3       3       267     154     1.      0.      0.
```

```
CBEAM   4       4       154     155     1.      0.      0.
CBEAM   5       5       155     156     1.      0.      0.
CBEAM   6       6       268     36      1.      0.      0.
CBEAM   7       7       36      42      1.      0.      0.
CBEAM   8       8       42      50      1.      0.      0.
CBEAM   9       9       50      437     1.      0.      0.
CBEAM   10      10      437     59      1.      0.      0.
CBEAM   11      11      59      431     1.      0.      0.
CBEAM   12      12      431     71      1.      0.      0.
CBEAM   13      13      71      84      1.      0.      0.
CBEAM   14      14      84      298     1.      0.      0.
CBEAM   15      15      298     286     1.      0.      0.
CBEAM   16      16      286     117     1.      0.      0.
CBEAM   17      17      117     285     1.      1.      0.
CBEAM   18      18      285     283     1.      1.      0.
CBEAM   19      19      283     284     1.      1.      0.
CBEAM   20      20      284     282     1.      1.      0.
CBEAM   21      21      282     281     1.      1.      0.
CBEAM   22      22      281     405     1.      0.      0.
CBEAM   31      31      36      35      1.      1.      0.
CBEAM   32      32      42      41      1.      1.      0.
CBEAM   33      33      50      49      1.      1.      0.
CBEAM   34      34      59      58      1.      1.      0.
CBEAM   35      35      71      70      1.      1.      0.
CBEAM   36      36      84      83      1.      1.      0.
CBEAM   37      37      117     116     1.      1.      0.
CBEAM   38      38      34      31      1.      1.      0.
CBEAM   39      39      40      37      1.      1.      0.
CBEAM   40      40      48      45      1.      1.      0.
CBEAM   41      41      57      54      1.      1.      0.
CBEAM   42      42      69      66      1.      1.      0.
CBEAM   43      43      82      94      1.      1.      0.
CBEAM   44      44      94      118     1.      1.      0.
CBEAM   45      45      118     121     1.      1.      0.
CBEAM   46      46      115     79      1.      1.      0.
CBEAM   47      47      79      120     1.      1.      0.
CBEAM   48      48      120     114     1.      1.      0.
CBEAM   49      49      31      37      1.      1.      0.      +49BM
+49BM   46
CBEAM   50      50      37      45      1.      1.      0.
CBEAM   51      51      45      54      1.      1.      0.
CBEAM   52      52      54      66      1.      1.      0.
CBEAM   53      53      66      121     1.      1.      0.      +53BM
+53BM           456
CBEAM   54      54      121     114     1.      1.      0.      +54BM
+54BM   456
CBEAM   55      55      118     119     1.      1.      0.
CBEAM   56      56      119     120     1.      1.      0.
CBEAM   57      57      94      79      1.      1.      0.
CBEAM   141     141     467     274     1.      1.      0.
CBEAM   142     142     274     465     1.      1.      0.
CBEAM   143     143     465     275     1.      1.      0.
CBEAM   144     144     275     278     1.      1.      0.
CBEAM   145     145     278     280     1.      1.      0.
CBEAM   146     146     280     292     1.      1.      0.
CBEAM   147     147     292     114     1.      1.      0.      +147BM
+147BM          456
CBEAM   148     148     466     273     1.      1.      0.
CBEAM   149     149     273     464     1.      1.      0.
CBEAM   150     150     464     276     1.      1.      0.
CBEAM   151     151     276     279     1.      1.      0.
CBEAM   152     152     279     290     1.      1.      0.
CBEAM   153     153     290     293     1.      1.      0.
CBEAM   154     154     293     79      1.      1.      0.      +154BM
+154BM          456
CBEAM   160     160     295     300     1.      1.      0.
CBEAM   161     161     117     300     1.      1.      0.
CBEAM   162     162     300     79      1.      1.      0.
CBEAM   163     163     79      114     1.      1.      0.
CBEAM   164     164     283     295     1.      1.      0.
CBEAM   165     165     295     294     1.      1.      0.
CBEAM   166     166     293     292     1.      1.      0.
CBEAM   167     167     282     291     1.      1.      0.
CBEAM   168     168     290     280     1.      1.      0.
CBEAM   169     169     279     271     1.      1.      0.      +169BM
+169BM  456
CBEAM   170     170     271     278     1.      1.      0.      +170BM
+170BM          56
CBEAM   171     171     281     277     1.      1.      0.
CBEAM   172     172     276     275     1.      1.      0.
CBEAM   173     173     464     465     1.      1.      0.
CBEAM   174     174     466     467     1.      1.      0.
CBEAM   175     175     271     272     1.      1.      0.      +175BM
+175BM  46
CBEAM   176     176     273     241     1.      1.      0.
CBEAM   177     177     241     299     1.      1.      0.
CBEAM   178     178     299     272     1.      1.      0.
CBEAM   179     179     272     274     1.      1.      0.
CBEAM   180     180     274     233     1.      1.      0.
CBEAM   181     181     195     296     1.      1.      0.      +181BM
+181BM  56
CBEAM   182     182     296     196     1.      1.      0.      +182BM
+182BM          56
CBEAM   1001    1001    33      39      1.      0.      0.
CBEAM   1002    1002    39      47      1.      0.      0.
CBEAM   1003    1003    47      56      1.      0.      0.
CBEAM   1004    1004    56      68      1.      0.      0.
CBEAM   1005    1005    68      81      1.      0.      0.
CBEAM   1007    1007    32      38      1.      0.      0.
CBEAM   1009    1009    30      38      1.      0.      0.
CBEAM   1010    1010    38      46      1.      0.      0.
CBEAM   1011    1011    46      55      1.      0.      0.
CBEAM   1012    1012    55      67      1.      0.      0.
CBEAM   1013    1013    67      80      1.      0.      0.
CBEAM   1014    1014    181     182     1.      0.      0.
CBEAM   1015    1015    182     183     1.      0.      0.
CBEAM   1016    1016    183     184     1.      0.      0.
CBEAM   1017    1017    184     185     1.      0.      0.
CBEAM   1018    1018    185     186     1.      0.      0.
CBEAM   1020    1020    29      44      1.      0.      0.
CBEAM   1022    1022    27      44      1.      0.      0.
CBEAM   1023    1023    44      53      1.      0.      0.
CBEAM   1024    1024    53      65      1.      0.      0.
CBEAM   1025    1025    65      78      1.      0.      0.
CBEAM   1026    1026    187     188     1.      0.      0.      +1026BM
+1026BM 56
CBEAM   1027    1027    188     189     1.      0.      0.
CBEAM   1028    1028    189     190     1.      0.      0.
CBEAM   1029    1029    190     191     1.      0.      0.
CBEAM   1031    1031    26      52      1.      0.      0.
CBEAM   1033    1033    25      52      1.      0.      0.
CBEAM   1034    1034    52      64      1.      0.      0.
CBEAM   1035    1035    64      245     1.      0.      0.
CBEAM   1036    1036    64      77      1.      0.      0.
CBEAM   1037    1037    245     77      1.      0.      0.
CBEAM   1038    1038    192     193     1.      0.      0.
CBEAM   1039    1039    193     63      1.      0.      0.
CBEAM   1040    1040    63      245     1.      0.      0.
CBEAM   1041    1041    245     76      1.      0.      0.
CBEAM   1043    1043    24      51      1.      0.      0.
CBEAM   1045    1045    23      51      1.      0.      0.
CBEAM   1046    1046    51      62      1.      0.      0.
CBEAM   1047    1047    22      62      1.      0.      0.
CBEAM   1048    1048    62      244     1.      0.      0.
CBEAM   1049    1049    244     75      1.      0.      0.
CBEAM   1050    1050    75      88      1.      0.      0.      +1050BM
CBEAM   1051    1051    21      61      1.      0.      0.
CBEAM   1052    1052    61      243     1.      0.      0.
CBEAM   1053    1053    243     74      1.      0.      0.      +1053BM
+1053BM         56
CBEAM   1054    1054    74      87      1.      0.      0.      +1054BM
CBEAM   1056    1056    20      60      1.      0.      0.
CBEAM   1057    1057    60      242     1.      0.      0.
CBEAM   1058    1058    242     73      1.      0.      0.      +1058BM
+1058BM         56
CBEAM   1059    1059    73      86      1.      0.      0.      +1059BM
CBEAM   1060    1060    19      143     1.      0.      0.
CBEAM   1061    1061    143     72      1.      0.      0.
CBEAM   1062    1062    72      85      1.      0.      0.      +1062BM
CBEAM   1071    1071    33      32      0.      1.      0.
CBEAM   1072    1072    32      30      0.      1.      0.
CBEAM   1073    1073    30      181     0.      1.      0.
CBEAM   1074    1074    181     29      0.      1.      0.
CBEAM   1075    1075    39      38      0.      1.      0.
CBEAM   1076    1076    38      182     0.      1.      0.
CBEAM   1077    1077    182     29      0.      1.      0.
CBEAM   1078    1078    29      27      0.      1.      0.
CBEAM   1079    1079    27      187     0.      1.      0.
CBEAM   1080    1080    187     26      0.      1.      0.
CBEAM   1081    1081    47      46      0.      1.      0.
CBEAM   1082    1082    46      183     0.      1.      0.
CBEAM   1083    1083    183     44      0.      1.      0.
CBEAM   1084    1084    44      188     0.      1.      0.
CBEAM   1085    1085    188     26      0.      1.      0.
CBEAM   1086    1086    26      25      0.      1.      0.
CBEAM   1087    1087    25      192     0.      1.      0.
CBEAM   1088    1088    192     24      0.      1.      0.
CBEAM   1089    1089    24      23      0.      1.      0.
CBEAM   1090    1090    23      22      0.      1.      0.
CBEAM   1091    1091    56      55      0.      1.      0.
CBEAM   1092    1092    55      184     0.      1.      0.
CBEAM   1093    1093    184     53      0.      1.      0.
CBEAM   1094    1094    53      189     0.      1.      0.
CBEAM   1095    1095    189     52      0.      1.      0.
CBEAM   1096    1096    52      193     0.      1.      0.
CBEAM   1097    1097    193     51      0.      1.      0.
CBEAM   1098    1098    51      22      0.      1.      0.      +1098BM
+1098BM         56
CBEAM   1099    1099    22      21      0.      1.      0.
CBEAM   1100    1100    21      20      0.      1.      0.
CBEAM   1101    1101    20      19      0.      1.      0.
CBEAM   1102    1102    68      67      0.      1.      0.
CBEAM   1103    1103    67      185     0.      1.      0.
CBEAM   1104    1104    185     65      0.      1.      0.
CBEAM   1105    1105    65      190     0.      1.      0.
CBEAM   1106    1106    190     64      0.      1.      0.
CBEAM   1107    1107    64      63      0.      1.      0.
CBEAM   1108    1108    63      62      0.      1.      0.
CBEAM   1109    1109    62      61      0.      1.      0.
CBEAM   1110    1110    61      60      0.      1.      0.
CBEAM   1111    1111    60      19      0.      1.      0.
CBEAM   1112    1112    245     244     0.      1.      0.
CBEAM   1113    1113    244     243     0.      1.      0.
CBEAM   1114    1114    243     242     0.      1.      0.
CBEAM   1115    1115    242     143     0.      1.      0.
CBEAM   1116    1116    81      80      0.      1.      0.
CBEAM   1117    1117    80      186     0.      1.      0.
CBEAM   1118    1118    186     78      0.      1.      0.
CBEAM   1119    1119    78      191     0.      1.      0.
CBEAM   1120    1120    191     77      0.      1.      0.
CBEAM   1121    1121    77      76      0.      1.      0.
CBEAM   1122    1122    76      75      0.      1.      0.
CBEAM   1123    1123    75      74      0.      1.      0.
CBEAM   1124    1124    74      73      0.      1.      0.
CBEAM   1125    1125    73      72      0.      1.      0.
CBEAM   1126    1126    88      87      0.      1.      0.      +1126BM
CBEAM   1127    1127    87      86      0.      1.      0.
CBEAM   1128    1128    86      85      0.      1.      0.      +1128BM
CBEAM   1131    1131    7       18      1.      0.      0.
CBEAM   1132    1132    6       16      1.      0.      0.
CBEAM   1133    1133    16      17      1.      0.      0.
CBEAM   1134    1134    17      30      1.      0.      0.      +BM1134
+BM1134 5
CBEAM   1135    1135    176     180     1.      0.      0.
CBEAM   1136    1136    5       14      1.      0.      0.
CBEAM   1137    1137    14      15      1.      0.      0.
CBEAM   1138    1138    15      27      1.      0.      0.      +BM1138
+BM1138 5
CBEAM   1139    1139    175     179     1.      0.      0.
CBEAM   1140    1140    4       12      1.      0.      0.
CBEAM   1141    1141    12      13      1.      0.      0.
CBEAM   1142    1142    13      25      1.      0.      0.      +BM1142
+BM1142 5
CBEAM   1143    1143    174     178     1.      0.      0.
CBEAM   1144    1144    3       10      1.      0.      0.
CBEAM   1145    1145    10      11      1.      0.      0.
CBEAM   1146    1146    11      23      1.      0.      0.      +BM1146
+BM1146 5
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CBEAM   1147    1147    173     177     1.      0.      0.
CBEAM   1148    1148    2       194     1.      0.      0.
CBEAM   1149    1149    194     9       1.      0.      0.
CBEAM   1150    1150    9       20      1.      0.      0.      +BM1150
+BM1150 5
CBEAM   1151    1151    1       8       1.      0.      0.
CBEAM   1152    1152    6       7       1.      0.      0.
CBEAM   1153    1153    176     6       1.      0.      0.
CBEAM   1154    1154    5       176     1.      0.      0.
CBEAM   1155    1155    175     5       1.      0.      0.
CBEAM   1156    1156    4       175     1.      0.      0.
CBEAM   1157    1157    174     4       1.      0.      0.
CBEAM   1158    1158    3       174     1.      0.      0.
CBEAM   1159    1159    173     3       1.      0.      0.
CBEAM   1160    1160    2       173     1.      0.      0.
CBEAM   1161    1161    1       2       1.      0.      0.
CBEAM   1162    1162    16      18      1.      0.      0.
CBEAM   1163    1163    180     16      1.      0.      0.
CBEAM   1164    1164    14      180     1.      0.      0.
CBEAM   1165    1165    179     14      1.      0.      0.
CBEAM   1166    1166    12      179     1.      0.      0.
CBEAM   1167    1167    178     12      1.      0.      0.
CBEAM   1168    1168    10      178     1.      0.      0.
CBEAM   1169    1169    177     10      1.      0.      0.
CBEAM   1170    1170    194     177     1.      0.      0.
CBEAM   1171    1171    8       194     1.      0.      0.
CBEAM   1181    1181    81      95      1.      0.      0.      +BM1181
+BM1181         456
CBEAM   1182    1182    95      142     1.      0.      0.
CBEAM   1183    1183    142     101     1.      0.      0.
CBEAM   1184    1184    101     107     1.      0.      0.
CBEAM   1185    1185    107     113     1.      0.      0.
CBEAM   1186    1186    93      141     1.      0.      0.
CBEAM   1187    1187    141     100     1.      0.      0.
CBEAM   1188    1188    100     106     1.      0.      0.
CBEAM   1189    1189    106     112     1.      0.      0.
CBEAM   1190    1190    186     124     1.      0.      0.      +BM1190
+BM1190         456
CBEAM   1191    1191    124     140     1.      0.      0.
CBEAM   1192    1192    140     127     1.      0.      0.
CBEAM   1193    1193    127     130     1.      0.      0.
CBEAM   1194    1194    130     133     1.      0.      0.
CBEAM   1195    1195    92      139     1.      0.      0.
CBEAM   1196    1196    139     99      1.      0.      0.
CBEAM   1197    1197    99      105     1.      0.      0.
CBEAM   1198    1198    105     111     1.      0.      0.
CBEAM   1199    1199    191     123     1.      0.      0.      +BM1199
+BM1199         456
CBEAM   1200    1200    123     138     1.      0.      0.
CBEAM   1201    1201    138     126     1.      0.      0.
CBEAM   1202    1202    126     129     1.      0.      0.
CBEAM   1203    1203    129     132     1.      0.      0.
CBEAM   1204    1204    91      137     1.      0.      0.
CBEAM   1205    1205    137     98      1.      0.      0.
CBEAM   1206    1206    98      104     1.      0.      0.
CBEAM   1207    1207    104     110     1.      0.      0.
CBEAM   1208    1208    122     136     1.      0.      0.
CBEAM   1209    1209    136     125     1.      0.      0.
CBEAM   1210    1210    125     128     1.      0.      0.
CBEAM   1211    1211    128     131     1.      0.      0.
CBEAM   1212    1212    76      90      1.      0.      0.      +BM1212
+BM1212         456
CBEAM   1213    1213    90      135     1.      0.      0.
CBEAM   1214    1214    135     97      1.      0.      0.
CBEAM   1215    1215    97      103     1.      0.      0.
CBEAM   1216    1216    103     109     1.      0.      0.
CBEAM   1217    1217    89      134     1.      0.      0.
CBEAM   1218    1218    134     96      1.      0.      0.
CBEAM   1219    1219    96      102     1.      0.      0.
CBEAM   1220    1220    102     108     1.      0.      0.
CBEAM   1231    1231    141     142     1.      0.      0.
CBEAM   1232    1232    140     141     1.      0.      0.
CBEAM   1233    1233    139     140     1.      0.      0.
CBEAM   1234    1234    138     139     1.      0.      0.
CBEAM   1235    1235    137     138     1.      0.      0.
CBEAM   1236    1236    136     137     1.      0.      0.
CBEAM   1237    1237    135     136     1.      0.      0.
CBEAM   1238    1238    134     135     1.      0.      0.
CBEAM   1241    1241    100     101     1.      0.      0.
CBEAM   1242    1242    127     100     1.      0.      0.
CBEAM   1243    1243    99      127     1.      0.      0.
CBEAM   1244    1244    126     99      1.      0.      0.
CBEAM   1245    1245    98      126     1.      0.      0.
CBEAM   1246    1246    125     98      1.      0.      0.
CBEAM   1247    1247    97      125     1.      0.      0.
CBEAM   1248    1248    96      97      1.      0.      0.
CBEAM   1251    1251    106     107     1.      0.      0.
CBEAM   1252    1252    130     106     1.      0.      0.
CBEAM   1253    1253    105     130     1.      0.      0.
CBEAM   1254    1254    129     105     1.      0.      0.
CBEAM   1255    1255    104     129     1.      0.      0.
CBEAM   1256    1256    128     104     1.      0.      0.
CBEAM   1257    1257    103     128     1.      0.      0.
CBEAM   1258    1258    102     103     1.      0.      0.
CBEAM   1261    1261    112     113     1.      0.      0.
CBEAM   1262    1262    133     112     1.      0.      0.
CBEAM   1263    1263    111     133     1.      0.      0.
CBEAM   1264    1264    132     111     1.      0.      0.
CBEAM   1265    1265    110     132     1.      0.      0.
CBEAM   1266    1266    131     110     1.      0.      0.
CBEAM   1267    1267    109     131     1.      0.      0.
CBEAM   1268    1268    108     109     1.      0.      0.
CBEAM   2001    2001    251     506     1.      1.      0.      +BM2001
+BM2001 456
CBEAM   2002    2002    506     233     1.      1.      0.
CBEAM   2003    2003    233     517     1.      1.      0.
CBEAM   2004    2004    517     262     1.      1.      0.      +BM2004
+BM2004         456
CBEAM   2005    2005    252     507     1.      1.      0.      +BM2005
+BM2005 456
CBEAM   2006    2006    507     257     1.      1.      0.
CBEAM   2007    2007    257     518     1.      1.      0.
CBEAM   2008    2008    518     262     1.      1.      0.      +BM2008
+BM2008         456
CBEAM   2009    2009    253     508     1.      1.      0.      +BM2009
+BM2009 456
CBEAM   2010    2010    508     258     1.      1.      0.
CBEAM   2011    2011    258     519     1.      1.      0.
CBEAM   2012    2012    519     263     1.      1.      0.      +BM2012
+BM2012         456
CBEAM   2013    2013    254     509     1.      1.      0.      +BM2013
+BM2013 456
CBEAM   2014    2014    509     259     1.      1.      0.
CBEAM   2015    2015    259     520     1.      1.      0.
CBEAM   2016    2016    520     264     1.      1.      0.      +BM2016
+BM2016         456
CBEAM   2017    2017    255     510     1.      1.      0.      +BM2017
+BM2017 456
CBEAM   2018    2018    510     260     1.      1.      0.
CBEAM   2019    2019    260     521     1.      1.      0.
CBEAM   2020    2020    521     265     1.      1.      0.      +BM2020
+BM2020         456
CBEAM   2021    2021    256     511     1.      1.      0.      +BM2021
+BM2021 456
CBEAM   2022    2022    511     261     1.      1.      0.      +BM2022
+BM2022         456
CBEAM   2023    2023    261     522     1.      1.      0.      +BM2023
+BM2023 456
CBEAM   2024    2024    522     266     1.      1.      0.      +BM2024
+BM2024         456
CBEAM   2031    2031    251     501     1.      1.      0.      +BM2031
+BM2031 456
CBEAM   2032    2032    501     252     1.      1.      0.
CBEAM   2033    2033    252     502     1.      1.      0.
CBEAM   2034    2034    502     253     1.      1.      0.
CBEAM   2035    2035    253     503     1.      1.      0.
CBEAM   2036    2036    503     254     1.      1.      0.
CBEAM   2037    2037    254     504     1.      1.      0.
CBEAM   2038    2038    504     255     1.      1.      0.
CBEAM   2039    2039    255     505     1.      1.      0.
CBEAM   2040    2040    505     256     1.      1.      0.      +BM2040
+BM2040         456
CBEAM   2041    2041    233     512     1.      1.      0.
CBEAM   2042    2042    512     257     1.      1.      0.
CBEAM   2043    2043    257     513     1.      1.      0.
CBEAM   2044    2044    513     258     1.      1.      0.
CBEAM   2045    2045    258     514     1.      1.      0.
CBEAM   2046    2046    514     259     1.      1.      0.
CBEAM   2047    2047    259     515     1.      1.      0.
CBEAM   2048    2048    515     260     1.      1.      0.
CBEAM   2049    2049    260     516     1.      1.      0.
CBEAM   2050    2050    516     261     1.      1.      0.      +BM2050
+BM2050         456
CBEAM   2051    2051    262     523     1.      1.      0.      +BM2051
+BM2051 456
CBEAM   2052    2052    523     263     1.      1.      0.
CBEAM   2053    2053    263     524     1.      1.      0.
CBEAM   2054    2054    524     264     1.      1.      0.
CBEAM   2055    2055    264     525     1.      1.      0.
CBEAM   2056    2056    525     265     1.      1.      0.
CBEAM   2057    2057    265     526     1.      1.      0.
CBEAM   2058    2058    526     266     1.      1.      0.      +BM2058
+BM2058         456
CBEAM   3001    3001    19      3007    0.      1.      0.
CBEAM   3002    3002    3001    3008    0.      1.      0.
CBEAM   3003    3003    3002    3003    1.      0.      0.
CBEAM   3004    3004    3003    3004    1.      0.      0.
CBEAM   3005    3005    3004    3005    1.      0.      0.
CBEAM   3006    3006    3005    3006    1.      0.      0.
CBEAM   3007    3007    3006    3007    1.      0.      0.
CBEAM   3008    3008    3007    3008    1.      0.      0.
CBEAM   3009    3009    3008    3009    1.      0.      0.      +3009
+3009           5
CBEAM   3131    3131    21      3076    0.      0.      1.      +3131
+3131   56
CBEAM   3132    3132    3076    61      0.      0.      1.      +3132
+3132           56
CBEAM   3133    3133    3076    3079    0.      1.      0.      +3133
+3133   5       6
CBEAM   3134    3133    3079    3083    0.      1.      0.
CBEAM   3135    3135    3082    3077    0.      1.      0.
CBEAM   3136    3136    3077    3078    0.      0.      1.      +3136
+3136           6
CBEAM   3137    3137    3084    3078    0.      1.      0.      +3137
+3137   6
CBEAM   3138    3138    3082    3083    0.      0.      1.      +3138
+3138   56
CBEAM   3139    3138    3083    3084    0.      0.      1.      +3139
+3139           56
CBEAM   3140    3140    3080    3081    0.      0.      1.
CBEAM   3141    3140    3081    3082    0.      0.      1.
CBEAM   3142    3140    3082    3084    0.      0.      1.
CBEAM   3143    3140    3084    3085    0.      0.      1.
CBEAM   3144    3144    3080    3081    0.      0.      1.      +3144
CBEAM   3145    3145    3081    3082    0.      0.      1.
CBEAM   3146    3146    3082    3084    0.      0.      1.
CBEAM   3147    3147    3084    3085    0.      0.      1.      +3147
+3147           5
CBEAM   3155    3155    3080    3087    0.      1.      0.      +3155
+3155   46
CBEAM   3156    3156    3081    3089    0.      1.      0.
CBEAM   3157    3155    3085    3090    0.      1.      0.      +3157
+3157   246
CBEAM   3255    3255    3080    3087    0.      1.      0.      +3255
+3255   46
CBEAM   3257    3255    3085    3090    0.      1.      0.      +3257
+3257   246
CBEAM   3391    3391    29      3196    0.      0.      1.      +3391
+3391   456
CBEAM   3392    3391    3196    182     0.      0.      1.      +3392
+3392           456
CBEAM   3393    3391    182     3197    0.      0.      1.      +3393
+3393   456
CBEAM   3394    3391    3197    38      0.      0.      1.      +3394
+3394           456
CBEAM   3395    3391    44      3198    0.      0.      1.      +3395
+3395   456
CBEAM   3396    3391    3198    183     0.      0.      1.      +3396
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+3396           456
CBEAM   3397    3391    183     3199    0.      0.      1.      +3397
+3397   456
CBEAM   3398    3391    3199    46      0.      0.      1.      +3398
+3398           456
CBEAM   3399    3391    3198    3200    0.      0.      1.
CBEAM   3400    3391    3200    3196    0.      0.      1.
CBEAM   3401    3391    3199    3202    0.      0.      1.
CBEAM   3402    3391    3202    3197    0.      0.      1.
CBEAM   3403    3391    3200    3201    0.      0.      1.      +3403
+3403   5
CBEAM   3404    3391    3201    3202    0.      0.      1.      +3404
+3404           5
CBEAM   3405    3405    3203    3204    0.      0.      1.
CBEAM   3406    3405    3204    3205    0.      0.      1.
CBEAM   3407    3407    3204    3206    0.      1.      0.      +3407
+3407           6
CBEAM   3408    3407    3206    3207    0.      1.      0.
CBEAM   3409    3409    3207    3208    0.      0.      1.
CBEAM   3410    3409    3209    3212    0.      1.      0.
CBEAM   3411    3405    3210    3211    0.      0.      1.
CBEAM   3412    3409    3211    3212    0.      0.      1.
CBEAM   3413    3405    3212    3213    0.      0.      1.
CBEAM   4148    4148    3086    3087    0.      0.      1.
CBEAM   4149    4148    3087    3088    0.      0.      1.
CBEAM   4150    4148    3088    3090    0.      0.      1.
CBEAM   4151    4151    3086    3087    0.      0.      1.
CBEAM   4152    4151    3087    3088    0.      0.      1.
CBEAM   4153    4151    3088    3089    0.      0.      1.
CBEAM   4154    4151    3089    3090    0.      0.      1.
CBEAM   5002    5002    153     267     1.      0.      0.
CBEAM   5051    5051    156     458     1.      0.      0.
CBEAM   5052    5052    458     459     1.      0.      0.
CBEAM   5053    5053    459     268     1.      0.      0.
CELAS2  61      36.6E6  34      5       35      5
CELAS2  62      71.0E6  40      5       41      5
CELAS2  63      94.1E6  48      5       49      5
CELAS2  64      132.4E6 57      5       58      5
CELAS2  65      110.0E6 69      5       70      5
CELAS2  66      51.7E6  82      5       83      5
CELAS2  67      5.0E6   115     5       116     5
CELAS2  191     11.25E6 277     5       276     5
CELAS2  192     22.0E6  291     5       290     5
CELAS2  193     9.68E6  294     5       293     5
CELAS2  194     156610. 298     3       195     3
CELAS2  195     67829.  284     3       196     3
CELAS2  1172    5650000.17      4       30      4
CELAS2  1173    5590000.15      4       27      4
CELAS2  1174    1600000.13      4       25      4
CELAS2  1175    2030000.11      4       23      4
CELAS2  1221    3307000.142     4       141     4
CELAS2  1222    268300. 141     4       140     4
CELAS2  1223    137300. 140     4       139     4
CELAS2  1224    105200. 139     4       138     4
CELAS2  1225    85600.  138     4       137     4
CELAS2  1226    69900.  137     4       136     4
CELAS2  1227    57700.  136     4       135     4
CELAS2  1228    40000.  135     4       134     4
CELAS2  1229    6229750.142     4       119     4
CELAS2  3161    193.E6  3076    4       3083    4
CELAS2  3414    1515.E5 3204    4       3207    4
CELAS2  3415    1724.E5 3212    4       3208    4
CELAS2  3416    580.4E5 3204    6       3207    6
CELAS2  3417    2652.5E53208    6       3209    6
CELAS2  3418    732.68E53208    5       3209    5
CONM1   301     19      0                               +301
+301    9.565
CONM1   302     72      0                               +302
+302    16.770
CONM1   303     20      0                               +303
+303    7.972
CONM1   304     60      0                               +304
+304    10.110
CONM1   305     73      0                               +305
+305    7.755
CONM1   306     21      0                               +306
+306    3.712
CONM1   307     61      0                               +307
+307    20.285
CONM1   308     74      0                               +308
+308    9.982
CONM1   309     51      0                               +309
+309    32.156
CONM1   310     62      0                               +310
+310    25.281
CONM1   311     75      0                               +311
+311    14.285
CONM1   312     26      0                               +312
+312    42.942
CONM1   313     52      0                               +313
+313    57.288
CONM1   314     64      0                               +314
+314    46.648
CONM1   315     77      0                               +315
+315    20.983
CONM1   316     29      0                               +316
+316    60.677
CONM1   317     44      0                               +317
+317    80.964
CONM1   318     53      0                               +318
+318    74.861
CONM1   319     65      0                               +319
+319    56.266
CONM1   320     78      0                               +320
+320    28.341
CONM1   321     33      0                               +321
+321    37.854
CONM1   322     39      0                               +322
+322    99.621
CONM1   323     47      0                               +323
+323    105.244
CONM1   324     56      0                               +324
+324    95.811
CONM1   325     68      0                               +325
+325    83.620
CONM1   326     81      0                               +326
+326    33.148
CONM1   341     85      0                               +341
+341    .6
CONM1   342     86      0                               +342
+342    1.6
CONM1   343     87      0                               +343
+343    1.8
CONM1   344     88      0                               +344
+344    1.
CONM1   345     6       0                               +345
+345    12.03
CONM1   346     17      0                               +346
+346    57.78
CONM1   347     5       0                               +347
+347    10.08
CONM1   348     15      0                               +348
+348    42.72
CONM1   349     4       0                               +349
+349    6.92
CONM1   350     13      0                               +350
+350    27.67
CONM1   351     3       0                               +351
+351    5.17
CONM1   352     11      0                               +352
+352    27.65
CONM1   353     2       0                               +353
+353    4.08
CONM1   354     9       0                               +354
+354    3.71
CONM1   355     95      0                               +355
+355    9.133
CONM1   356     107     0                               +356
+356    6.765
CONM1   357     113     0                               +357
+357    .022
CONM1   358     93      0                               +358
+358    10.32
CONM1   359     106     0                               +359
+359    10.12
CONM1   360     112     0                               +360
+360    .149
CONM1   361     124     0                               +361
+361    5.816
CONM1   362     130     0                               +362
+362    7.986
CONM1   363     133     0                               +363
+363    .998
CONM1   364     92      0                               +364
+364    4.56
CONM1   365     105     0                               +365
+365    6.797
CONM1   366     111     0                               +366
+366    .952
CONM1   367     123     0                               +367
+367    3.296
CONM1   368     129     0                               +368
+368    4.727
CONM1   369     132     0                               +369
+369    .647
CONM1   370     91      0                               +370
+370    2.069
CONM1   371     104     0                               +371
+371    3.014
CONM1   372     110     0                               +372
+372    .477
CONM1   373     122     0                               +373
+373    1.784
CONM1   374     128     0                               +374
+374    2.632
CONM1   375     131     0                               +375
+375    .435
CONM1   376     90      0                               +376
+376    1.644
CONM1   377     103     0                               +377
+377    2.354
CONM1   378     109     0                               +378
+378    .272
CONM1   379     89      0                               +379
+379    .651
CONM1   380     102     0                               +380
+380    1.075
CONM1   381     108     0                               +381
+381    .284
CONM1   391     163     0                               +391
+391    314.21
CONM1   392     153     0                               +392
+392    463.77
CONM1   393     154     0                               +393
+393    870.68
CONM1   394     155     0                               +394
+394    1299.38
CONM1   395     156     0                               +395
+395    1545.78
CONM1   396     42      0                               +396
+396    1799.25
CONM1   397     71      0                               +397
+397    1412.77
CONM1   398     286     0                               +398
+398    893.77
CONM1   399     284     0                               +399
+399    335.19
CONM1   400     281     0                               +400
+400    708.33
CONM1   401     163     0       314.21
CONM1   402     153     0       463.77
CONM1   403     154     0       870.68
CONM1   404     155     0       1299.38
CONM1   405     156     0       1545.78
CONM1   406     42      0       2036.16
CONM1   407     71      0       2468.11
CONM1   408     286     0       893.77
CONM1   409     284     0       311.29
```

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CONM1   410     281     0       796.72                                  +411
CONM1   411     153     0                                               +411A
+411
+411A           119126.
CONM1   412     154     0                                               +412
+412                                                                    +412A
+412A           498740.
CONM1   413     155     0                                               +413
+413                                                                    +413A
+413A           233410.
CONM1   414     156     0                                               +414
+414                                                                    +414A
+414A           865169.
CONM1   415     42      0                                               +415
+415                                                                    +415A
+415A           1051483.
CONM1   416     71      0                                               +416
+416                                                                    +416A
+416A           1042917.
CONM1   417     286     0                                               +417
+417                                                                    +417A
+417A           556929.
CONM1   418     284     0                                               +418
+418                                                                    +418A
+418A           756147.
CONM1   430     195     0                                               +430
+430    -82.94
CONM1   431     296     0                                               +431
+431                            3803477.
CONM1   432     296     0                                               +432
+432    2073.44
CONM1   433     42      0                       12204.0
CONM1   434     437     0                                               +434
+434                                                                    +434A
+434A                                                   19.7E6
CONM1   435     281     0                                               +435
+435                                                                    +435A
+435A                                                   945062.
CONM1   436     410     0                                               +436
+436                                                                    +436A
+436A           502624.
CONM1   437     410     0                                               +437
+437                                                                    +437A
+437A                                                   3604069.
CONM1   438     410     0       1990.5
CONM1   446     251     0                                               +446
+446    4.65
CONM1   447     252     0                                               +447
+447    5.123
CONM1   448     253     0                                               +448
+448    4.812
CONM1   449     254     0                                               +449
+449    3.069
CONM1   450     255     0                                               +450
+450    1.73
CONM1   451     256     0                                               +451
+451    2.547
CONM1   452     233     0                                               +452
+452    176.302
CONM1   453     257     0                                               +453
+453    31.053
CONM1   454     258     0                                               +454
+454    17.674
CONM1   455     259     0                                               +455
+455    11.742
CONM1   456     260     0                                               +456
+456    7.391
CONM1   457     261     0                                               +457
+457    2.877
CONM1   458     262     0                                               +458
+458    3.675
CONM1   459     263     0                                               +459
+459    3.064
CONM1   460     264     0                                               +460
+460    2.838
CONM1   461     265     0                                               +461
+461    2.73
CONM1   462     266     0                                               +462
+462    .976
CONM1   501     407     0       18.24
CONM1   502     409     0       24.64
CONM1   503     367     0       23.43
CONM1   504     408     0       30.93
CONM1   505     368     0       4.55
CONM1   506     359     0       15.9
CONM1   507     384     0       15.24
CONM1   508     389     0       .75
CONM1   509     369     0       3.81
CONM1   510     360     0       6.67
CONM1   511     385     0       5.77
CONM1   512     390     0       1.11
CONM1   513     370     0       2.55
CONM1   514     361     0       3.55
CONM1   515     386     0       3.1
CONM1   516     391     0       .93
CONM1   517     371     0       1.12
CONM1   518     362     0       2.9
CONM1   519     387     0       2.4
CONM1   520     392     0       .59
CONM1   521     393     0       .37
CONM1   522     373     0       1.94
CONM1   523     364     0       .48
CONM1   524     381     0       2.66
CONM1   525     383     0       .89
CONM1   526     281                                             +526
+526                            822933.
CONM1   3020    3004                                            +3020
+3020   23.24
CONM1   3021    3006                                            +3021
+3021   21.35
CONM1   3022    3009                                            +3022
+3022   14.41
CONM1   3023    3002                                            +3023
+3023   16.5
```

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CONM1   3045    3088            200.            200.                    +3045
+3045   200.                            236476.8                        +3045A
+3045A          1947.                                           236476.
CONM1   3176    3076    0                                               +3176
+3176   25.4
CONM1   3177    3079    0                       25.4
CONM1   3178    3080    0       56.46                                   +3178
+3178   56.73
CONM1   3179    3081    0                                               +3179
+3179   -4.88
CONM1   3180    3082    0       7.47
CONM1   3181    3083    0                       87.0
CONM1   3182    3085    0       35.77                                   +3182
+3182   35.15
CONM1   3427    3204    0                                               +3427
+3427   208.0                   125.E3
CONM1   3428    3206    0                       208.
CONM1   3429    3207    0       208.0                                   +3429
+3429                                                                   +3429A
+3429A                                                  125.E3
CONM1   3430    3210    0       .01                                     +40430
+40430  .01
CONM1   3431    3211    0       229.3                                   +40431
+40431  229.3                   561149.                                 +40431A
+40431A         32000.                                          561149.
CONM1   3432    3212    0                       231.3
CONM1   3433    3213    0       2.0                                     +40433
+40433  2.0
CONM2   3501    3500            345.    0.      0.      0.              +000001
++000001448146.7        3013.92         447868.5                        +000002
CONM2   3504    3501            138.    0.      0.      0.              +000003
++000003665381.01       6769.7          62828.60                        +000004
CONROD  183     272     233     2               16.0875
CONROD  2201    233     1233    2       .0001
CONROD  2202    233     2233    2       .0001
CONROD  2203    251     1251    2       .0001
CONROD  2204    251     2251    2       .0001
CONROD  2205    252     1252    2       .0001
CONROD  2206    252     2252    2       .0001
CONROD  2207    253     1253    2       .0001
CONROD  2208    253     2253    2       .0001
CONROD  2209    254     1254    2       .0001
CONROD  2210    254     2254    2       .0001
CONROD  2211    255     1255    2       .0001
CONROD  2212    255     2255    2       .0001
CONROD  2213    256     1256    2       .0001
CONROD  2214    256     2256    2       .0001
CONROD  2215    257     1257    2       .0001
CONROD  2216    257     2257    2       .0001
CONROD  2217    258     1258    2       .0001
CONROD  2218    258     2258    2       .0001
CONROD  2219    259     1259    2       .0001
CONROD  2220    259     2259    2       .0001
CONROD  2221    260     1260    2       .0001
CONROD  2222    260     2260    2       .0001
CONROD  2223    261     1261    2       .0001
CONROD  2224    261     2261    2       .0001
CONROD  2225    262     1262    2       .0001
CONROD  2226    262     2262    2       .0001
CONROD  2227    263     1263    2       .0001
CONROD  2228    263     2263    2       .0001
CONROD  2229    264     1264    2       .0001
CONROD  2230    264     2264    2       .0001
CONROD  2231    265     1265    2       .0001
CONROD  2232    265     2265    2       .0001
CONROD  2233    266     1266    2       .0001
CONROD  2234    266     2266    2       .0001
CONROD  3010    3004    3007    2               4.5
CONROD  3160    3080    3082    2               20.
CORD1R  5       701     702     703
CORD2C *3               0               -63.574         -294.247        *CORD3A
*CORD3A 0.              -143.398002     -351.530085     0.              +CORD3B
+CORD3B -63.574 -294.247100.
CORD2R  1       0       -62.153 -293.2270.      -62.153 -293.227100.    *CORD1
*CORD1  19.092002       -234.923915     0.
CORD2R  7       0       -41.5   -378.02 0.      -41.5   -378.02 100.    *CORD7
*CORD7  57.2946361      -362.5403399    0.
CQUAD4  601     601     1033    1039    1038    1032
CQUAD4  602     602     1039    1047    1046    1038
CQUAD4  603     603     1047    1056    1055    1046
CQUAD4  604     604     1056    1068    1067    1055
CQUAD4  605     605     1068    1081    1080    1067
CQUAD4  607     607     1038    1182    1181    1030
CQUAD4  608     608     1038    1046    1183    1182
CQUAD4  609     609     1046    1055    1184    1183
CQUAD4  610     610     1055    1067    1185    1184
CQUAD4  611     611     1067    1080    1186    1185
CQUAD4  613     613     1182    1183    1044    1029
CQUAD4  614     614     1183    1184    1053    1044
CQUAD4  615     615     1184    1185    1065    1053
CQUAD4  616     616     1185    1186    1078    1065
CQUAD4  618     618     1027    1044    1188    1187
CQUAD4  619     619     1044    1053    1189    1188
CQUAD4  620     620     1053    1065    1190    1189
CQUAD4  621     621     1065    1078    1191    1190
CQUAD4  623     623     1188    1189    1052    1026
CQUAD4  624     624     1189    1190    1064    1052
CQUAD4  625     625     1190    1191    1077    1064
CQUAD4  627     627     1025    1052    1193    1192
CQUAD4  628     628     1052    1064    1063    1193
CQUAD4  632     632     1192    1193    1051    1024
CQUAD4  633     633     1193    1063    1062    1051
CQUAD4  634     634     1063    1245    1244    1062
CQUAD4  635     635     1245    1076    1075    1244
CQUAD4  639     639     1062    1061    1021    1022
CQUAD4  640     640     1062    1244    1243    1061
CQUAD4  641     641     1244    1075    1074    1243
CQUAD4  643     643     1021    1061    1060    1020
CQUAD4  644     644     1061    1243    1242    1060
CQUAD4  645     645     1243    1074    1073    1242
CQUAD4  648     648     1060    1242    1143    1019
CQUAD4  649     649     1242    1073    1072    1143
CQUAD4  661     661     1142    1101    1100    1141
CQUAD4  662     662     1101    1107    1106    1100
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CQUAD4  663     663     1107    1113    1112    1106
CQUAD4  664     664     1141    1100    1127    1140
CQUAD4  665     665     1100    1106    1130    1127
CQUAD4  666     666     1106    1112    1133    1130
CQUAD4  667     667     1140    1127    1099    1139
CQUAD4  668     668     1127    1130    1105    1099
CQUAD4  669     669     1130    1133    1111    1105
CQUAD4  670     670     1139    1099    1126    1138
CQUAD4  671     671     1099    1105    1129    1126
CQUAD4  672     672     1105    1111    1132    1129
CQUAD4  673     673     1138    1126    1098    1137
CQUAD4  674     674     1126    1129    1104    1098
CQUAD4  675     675     1129    1132    1110    1104
CQUAD4  676     676     1137    1098    1125    1136
CQUAD4  677     677     1098    1104    1128    1125
CQUAD4  678     678     1104    1110    1131    1128
CQUAD4  679     679     1136    1125    1097    1135
CQUAD4  680     680     1125    1128    1103    1097
CQUAD4  681     681     1128    1131    1109    1103
CQUAD4  682     682     1135    1097    1096    1134
CQUAD4  683     683     1097    1103    1102    1096
CQUAD4  684     684     1103    1109    1108    1102
CQUAD4  1601    601     2033    2039    2038    2032
CQUAD4  1602    602     2039    2047    2046    2038
CQUAD4  1603    603     2047    2056    2055    2046
CQUAD4  1604    604     2056    2068    2067    2055
CQUAD4  1605    605     2068    2081    2080    2067
CQUAD4  1607    607     2038    2182    2181    2030
CQUAD4  1608    608     2038    2046    2183    2182
CQUAD4  1609    609     2046    2055    2184    2183
CQUAD4  1610    610     2055    2067    2185    2184
CQUAD4  1611    611     2067    2080    2186    2185
CQUAD4  1613    613     2182    2183    2044    2029
CQUAD4  1614    614     2183    2184    2053    2044
CQUAD4  1615    615     2184    2185    2065    2053
CQUAD4  1616    616     2185    2186    2078    2065
CQUAD4  1618    618     2027    2044    2188    2187
CQUAD4  1619    619     2044    2053    2189    2188
CQUAD4  1620    620     2053    2065    2190    2189
CQUAD4  1621    621     2065    2078    2191    2190
CQUAD4  1623    623     2188    2189    2052    2026
CQUAD4  1624    624     2189    2190    2064    2052
CQUAD4  1625    625     2190    2191    2077    2064
CQUAD4  1627    627     2025    2052    2193    2192
CQUAD4  1628    628     2052    2064    2063    2193
CQUAD4  1632    632     2192    2193    2051    2024
CQUAD4  1633    633     2193    2063    2062    2051
CQUAD4  1634    634     2063    2245    2244    2062
CQUAD4  1635    635     2245    2076    2075    2244
CQUAD4  1639    639     2062    2061    2021    2022
CQUAD4  1640    640     2062    2244    2243    2061
CQUAD4  1641    641     2244    2075    2074    2243
CQUAD4  1643    643     2021    2061    2060    2020
CQUAD4  1644    644     2061    2243    2242    2060
CQUAD4  1645    645     2243    2074    2073    2242
CQUAD4  1648    648     2060    2242    2143    2019
CQUAD4  1649    649     2242    2073    2072    2143
CQUAD4  1661    661     2142    2101    2100    2141
CQUAD4  1662    662     2101    2107    2106    2100
CQUAD4  1663    663     2107    2113    2112    2106
CQUAD4  1664    664     2141    2100    2127    2140
CQUAD4  1665    665     2100    2106    2130    2127
CQUAD4  1666    666     2106    2112    2133    2130
CQUAD4  1667    667     2140    2127    2099    2139
CQUAD4  1668    668     2127    2130    2105    2099
CQUAD4  1669    669     2130    2133    2111    2105
CQUAD4  1670    670     2139    2099    2126    2138
CQUAD4  1671    671     2099    2105    2129    2126
CQUAD4  1672    672     2105    2111    2132    2129
CQUAD4  1673    673     2138    2126    2098    2137
CQUAD4  1674    674     2126    2129    2104    2098
CQUAD4  1675    675     2129    2132    2110    2104
CQUAD4  1676    676     2137    2098    2125    2136
CQUAD4  1677    677     2098    2104    2128    2125
CQUAD4  1678    678     2104    2110    2131    2128
CQUAD4  1679    679     2136    2125    2097    2135
CQUAD4  1680    680     2125    2128    2103    2097
CQUAD4  1681    681     2128    2131    2109    2103
CQUAD4  1682    682     2135    2097    2096    2134
CQUAD4  1683    683     2097    2103    2102    2096
CQUAD4  1684    684     2103    2109    2108    2102
CQUAD8  701     701     1257    1252    1251    1233    1507    1501    +701
+701    1506    1512                                    99.5
CQUAD8  702     702     1252    1257    1258    1253    1507    1513    +702
+702    1508    1502                                    99.5
CQUAD8  703     703     1253    1258    1259    1254    1508    1514    +703
+703    1509    1503                                    99.5
CQUAD8  704     704     1254    1259    1260    1255    1509    1515    +704
+704    1510    1504                                    99.5
CQUAD8  705     705     1255    1260    1261    1256    1510    1516    +705
+705    1511    1505                                    99.5
CQUAD8  707     707     1257    1262    1263    1258    1518    1523    +707
+707    1519    1513                                    99.5
CQUAD8  708     708     1258    1263    1264    1259    1519    1524    +708
+708    1520    1514                                    99.5
CQUAD8  709     709     1259    1264    1265    1260    1520    1525    +709
+709    1521    1515                                    99.5
CQUAD8  710     710     1260    1265    1266    1261    1521    1526    +710
+710    1522    1516                                    99.5
CQUAD8  1701    701     2257    2252    2251    2233    2507    2501    +1701
+1701   2506    2512                                    99.5
CQUAD8  1702    702     2252    2257    2258    2253    2507    2513    +1702
+1702   2508    2502                                    99.5
CQUAD8  1703    703     2253    2258    2259    2254    2508    2514    +1703
+1703   2509    2503                                    99.5
CQUAD8  1704    704     2254    2259    2260    2255    2509    2515    +1704
+1704   2510    2504                                    99.5
CQUAD8  1705    705     2255    2260    2261    2256    2510    2516    +1705
+1705   2511    2505                                    99.5
CQUAD8  1707    707     2257    2262    2263    2258    2518    2523    +1707
+1707   2519    2513                                    99.5
CQUAD8  1708    708     2258    2263    2264    2259    2519    2524    +1708
+1708   2520    2514                                    99.5
CQUAD8  1709    709     2259    2264    2265    2260    2520    2525    +1709
+1709   2521    2515                                    99.5
CQUAD8  1710    710     2260    2265    2266    2261    2521    2526    +1710
+1710   2522    2516                                    99.5
CSHEAR  71      71      1034    1040    1037    1031
CSHEAR  72      72      1040    1048    1045    1037
CSHEAR  73      73      1048    1057    1054    1045
CSHEAR  74      74      1057    1069    1066    1054
CSHEAR  75      75      1069    1082    1121    1066
CSHEAR  76      76      1094    1079    1114    1121
CSHEAR  77      71      2034    2040    2037    2031
CSHEAR  78      72      2040    2048    2045    2037
CSHEAR  79      73      2048    2057    2054    2045
CSHEAR  80      74      2057    2069    2066    2054
CSHEAR  81      75      2069    2082    2121    2066
CSHEAR  82      76      2094    2079    2114    2121
CSHEAR  201     201     1465    1464    1466    1467
CSHEAR  202     202     1275    1276    1464    1465
CSHEAR  203     203     1280    1290    1276    1275
CSHEAR  204     204     1114    1079    1293    1292
CSHEAR  205     201     2465    2464    2466    2467
CSHEAR  206     202     2275    2276    2464    2465
CSHEAR  207     203     2280    2290    2276    2275
CSHEAR  208     204     2114    2079    2293    2292
CSHEAR  642     642     1075    1088    1087    1074
CSHEAR  646     646     1074    1087    1086    1073
CSHEAR  650     650     1073    1086    1085    1072
CSHEAR  651     651     1007    1018    1016    1006
CSHEAR  652     652     1006    1016    1180    1176
CSHEAR  653     653     1176    1180    1014    1005
CSHEAR  654     654     1005    1014    1179    1175
CSHEAR  655     655     1175    1179    1012    1004
CSHEAR  656     656     1004    1012    1178    1174
CSHEAR  657     657     1174    1178    1010    1003
CSHEAR  658     658     1003    1010    1177    1173
CSHEAR  659     659     1173    1177    1194    1002
CSHEAR  660     660     1002    1194    1008    1001
CSHEAR  1642    642     2075    2088    2087    2074
CSHEAR  1646    646     2074    2087    2086    2073
CSHEAR  1650    650     2073    2086    2085    2072
CSHEAR  1651    651     2007    2018    2016    2006
CSHEAR  1652    652     2006    2016    2180    2176
CSHEAR  1653    653     2176    2180    2014    2005
CSHEAR  1654    654     2005    2014    2179    2175
CSHEAR  1655    655     2175    2179    2012    2004
CSHEAR  1656    656     2004    2012    2178    2174
CSHEAR  1657    657     2174    2178    2010    2003
CSHEAR  1658    658     2003    2010    2177    2173
CSHEAR  1659    659     2173    2177    2194    2002
CSHEAR  1660    660     2002    2194    2008    2001
CSHEAR  3158    3158    3091    3092    3094    3093
CSHEAR  3159    3158    3095    3096    3098    3097
CTRIA3  606     606     1032    1038    1030
CTRIA3  612     612     1181    1182    1029
CTRIA3  617     617     1029    1044    1027
CTRIA3  622     622     1187    1188    1026
CTRIA3  626     626     1026    1052    1025
CTRIA3  629     629     1064    1245    1063
CTRIA3  630     630     1064    1077    1245
CTRIA3  631     631     1077    1076    1245
CTRIA3  636     636     1051    1023    1024
CTRIA3  637     637     1051    1022    1023
CTRIA3  638     638     1062    1022    1051
CTRIA3  647     647     1019    1020    1060
CTRIA3  1606    606     2032    2038    2030
CTRIA3  1612    612     2181    2182    2029
CTRIA3  1617    617     2029    2044    2027
CTRIA3  1622    622     2187    2188    2026
CTRIA3  1626    626     2026    2052    2025
CTRIA3  1629    629     2064    2245    2063
CTRIA3  1630    630     2064    2077    2245
CTRIA3  1631    631     2077    2076    2245
CTRIA3  1636    636     2051    2023    2024
CTRIA3  1637    637     2051    2022    2023
CTRIA3  1638    638     2062    2022    2051
CTRIA3  1647    647     2019    2020    2060
CTRIA6  706     706     1262    1257    1233    1518    1512    1517    +706
+706    99.5
CTRIA6  1706    706     2262    2257    2233    2518    2512    2517    +1706
+1706   99.5
DMIG    VTAIL   0       6       1       0
DMIG    *VTAIL          357             1                               *9001
*9001   357             1               0.127440E+06
DMIG    *VTAIL          358             1                               *9002
*9002   357             1               -.217072E+05                    *9003
*9003   358             1               0.680871E+05
DMIG    *VTAIL          359             1                               *9004
*9004   357             1               0.352175E+03                    *9005
*9005   358             1               -.193333E+05                    *9006
*9006   359             1               0.717224E+05
DMIG    *VTAIL          360             1                               *9007
*9007   357             1               0.456481E+03                    *9008
*9008   358             1               -.301624E+03                    *9009
*9009   359             1               -.903472E+04                    *9010
*9010   360             1               0.507642E+05
DMIG    *VTAIL          361             1                               *9011
*9011   357             1               -.131707E+02                    *9012
*9012   358             1               0.315215E+03                    *9013
*9013   359             1               -.103102E+04                    *9014
*9014   360             1               -.504458E+04                    *9015
*9015   361             1               0.468148E+05
DMIG    *VTAIL          362             1                               *9016
*9016   357             1               0.739752E+00                    *9017
*9017   358             1               -.313943E+02                    *9018
*9018   359             1               0.841453E+02                    *9019
*9019   360             1               0.764191E+02                    *9020
*9020   361             1               -.117072E+05                    *9021
*9021   362             1               0.484915E+05
DMIG    *VTAIL          363             1                               *9022
*9022   357             1               0.363626E+00                    *9023
*9023   358             1               -.206621E+01                    *9024
*9024   359             1               0.170371E+02                    *9025
*9025   360             1               -.128679E+03                    *9026
*9026   361             1               0.142936E+04                    *9027
*9027   362             1               -.141053E+05                    *9028
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*9028   363          1          0.334950E+05
DMIG    *VTAIL       364        1                                    *9029
*9029   357          1          -.178665E+00                         *9030
*9030   358          1          0.286879E+01                         *9031
*9031   359          1          -.179730E+02                         *9032
*9032   360          1          0.822153E+02                         *9033
*9033   361          1          -.308830E+03                         *9034
*9034   362          1          0.163581E+04                         *9035
*9035   363          1          -.934300E+04                         *9036
*9036   364          1          0.133364E+05
DMIG    *VTAIL       367        1                                    *9037
*9037   357          1          0.156429E+04                         *9038
*9038   358          1          -.126722E+05                         *9039
*9039   359          1          -.249630E+02                         *9040
*9040   360          1          0.252357E+03                         *9041
*9041   361          1          0.220342E+02                         *9042
*9042   362          1          -.348368E+01                         *9043
*9043   363          1          0.213553E-02                         *9044
*9044   364          1          0.287588E+00                         *9045
*9045   367          1          0.573159E+05
DMIG    *VTAIL       368        1                                    *9046
*9046   357          1          0.150006E+03                         *9047
*9047   358          1          -.349447E+04                         *9048
*9048   359          1          -.184666E+05                         *9049
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*9050   361          1          0.413201E+03                         *9051
*9051   362          1          -.489800E+02                         *9052
*9052   363          1          -.271009E+00                         *9053
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*9054   367          1          -.502776E+04                         *9055
*9055   368          1          0.246725E+05
DMIG    *VTAIL       369        1                                    *9056
*9056   357          1          0.292477E+03                         *9057
*9057   358          1          0.106678E+04                         *9058
*9058   359          1          -.372974E+04                         *9059
*9059   360          1          -.163066E+05                         *9060
*9060   361          1          -.720338E+03                         *9061
*9061   362          1          0.400484E+03                         *9062
*9062   363          1          0.516836E+00                         *9063
*9063   364          1          -.141972E+02                         *9064
*9064   367          1          0.245134E+03                         *9065
*9065   368          1          -.625047E+04                         *9066
*9066   369          1          0.208907E+05
DMIG    *VTAIL       370        1                                    *9067
*9067   357          1          0.109520E+02                         *9068
*9068   358          1          -.429165E+02                         *9069
*9069   359          1          0.371999E+03                         *9070
*9070   360          1          -.238343E+04                         *9071
*9071   361          1          -.147446E+05                         *9072
*9072   362          1          0.690143E+03                         *9073
*9073   363          1          0.723676E+03                         *9074
*9074   364          1          0.244021E+02                         *9075
*9075   367          1          -.574195E+02                         *9076
*9076   368          1          0.416297E+03                         *9077
*9077   369          1          -.416404E+04                         *9078
*9078   370          1          0.182966E+05
DMIG    *VTAIL       371        1                                    *9079
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*9080   358          1          -.105520E+02                         *9081
*9081   359          1          0.537074E+02                         *9082
*9082   360          1          0.115046E+03                         *9083
*9083   361          1          -.455381E+03                         *9084
*9084   362          1          -.131301E+05                         *9085
*9085   363          1          0.208463E+04                         *9086
*9086   364          1          -.271085E+03                         *9087
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*9088   368          1          -.234544E+03                         *9089
*9089   369          1          0.874696E+03                         *9090
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*9091   371          1          0.300624E+05
DMIG    *VTAIL       372        1                                    *9092
*9092   357          1          0.463602E+00                         *9093
*9093   358          1          -.677371E+01                         *9094
*9094   359          1          -.134083E+02                         *9095
*9095   360          1          0.577641E+02                         *9096
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*9097   362          1          -.915742E+03                         *9098
*9098   363          1          -.544593E+04                         *9099
*9099   364          1          0.116824E+04                         *9100
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*9103   370          1          0.187626E+04                         *9104
*9104   371          1          -.192798E+05                         *9105
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DMIG    *VTAIL       373        1                                    *9106
*9106   357          1          0.484957E-02                         *9107
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*9108   359          1          -.691597E+00                         *9109
*9109   360          1          -.875753E+00                         *9110
*9110   361          1          0.363362E+02                         *9111
*9111   362          1          0.411035E+01                         *9112
*9112   363          1          -.163347E+04                         *9113
*9113   364          1          -.258823E+04                         *9114
*9114   367          1          0.345739E+00                         *9115
*9115   368          1          -.422117E+01                         *9116
*9116   369          1          0.101714E+02                         *9117
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*9118   371          1          0.270474E+04                         *9119
*9119   372          1          -.730833E+04                         *9120
*9120   373          1          0.703131E+04
DMIG    *VTAIL       375        1                                    *9121
*9121   357          1          -.230046E+04                         *9122
*9122   358          1          -.497159E+05                         *9123
*9123   359          1          0.157355E+04                         *9124
*9124   360          1          0.126726E+04                         *9125
*9125   361          1          0.195618E+03                         *9126
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DMIG    *VTAIL       376        1                                    *9137
*9137   357          1          0.922286E+03                         *9138
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DMIG    *VTAIL       378        1                                    *9172
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*9209   378          1          -.143803E+05                         *9210
*9210   379          1          0.259716E+05
DMIG    *VTAIL       380        1                                    *9211
*9211   357          1          -.681648E-01                         *9212
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*9216   362          1          0.156462E+04                         *9217
*9217   363          1          -.188062E+05                         *9218
*9218   364          1          -.222663E+04                         *9219
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*9230   379          1          -.100636E+05                         *9231
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DMIG    *VTAIL       381        1                                    *9232
*9232   357          1          -.215496E-02                         *9233
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*9246   373          1          0.449404E+03          *9247
*9247   375          1          0.842499E+01          *9248
*9248   376          1          -.320128E+02          *9249
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*9250   378          1          -.617478E+03          *9251
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*9252   380          1          -.113558E+05          *9253
*9253   381          1          0.131793E+05
DMIG    *VTAIL       382        1                     *9254
*9254   357          1          -.211797E-02          *9255
*9255   358          1          0.196775E-01          *9256
*9256   359          1          -.154809E+00          *9257
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*9260   363          1          0.393001E+02          *9261
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*9266   371          1          0.122064E+02          *9267
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*9268   373          1          -.479232E+02          *9269
*9269   375          1          0.117696E+00          *9270
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*9271   377          1          0.991771E+00          *9272
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*9275   381          1          -.475810E+03          *9276
*9276   382          1          0.179643E+04
DMIG    *VTAIL       383        1                     *9277
*9277   357          1          0.311274E-03          *9278
*9278   358          1          -.479934E-02          *9279
*9279   359          1          0.182106E-01          *9280
*9280   360          1          -.183852E+00          *9281
*9281   361          1          -.116182E+01          *9282
*9282   362          1          -.255904E+01          *9283
*9283   363          1          0.112750E+01          *9284
*9284   364          1          -.358622E+02          *9285
*9285   367          1          -.179107E-02          *9286
*9286   368          1          0.109064E-01          *9287
*9287   369          1          -.797350E-01          *9288
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*9289   371          1          -.258086E+01          *9290
*9290   372          1          -.318473E+01          *9291
*9291   373          1          -.249386E+01          *9292
*9292   375          1          0.754849E-01          *9293
*9293   376          1          -.271080E+00          *9294
*9294   377          1          0.703442E+00          *9295
*9295   378          1          -.611849E+01          *9296
*9296   379          1          0.611220E+02          *9297
*9297   380          1          0.131850E+04          *9298
*9298   381          1          -.653645E+03          *9299
*9299   382          1          -.643881E+03          *9300
*9300   383          1          0.830302E+03
DMIG    *VTAIL       384        1                     *9301
*9301   357          1          0.265363E+05          *9302
*9302   358          1          0.282354E+05          *9303
*9303   359          1          -.948610E+04          *9304
*9304   360          1          -.219314E+04          *9305
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*9306   362          1          0.553337E+02          *9307
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*9314   372          1          -.926415E+01          *9315
*9315   373          1          -.122039E+01          *9316
*9316   375          1          -.569831E+06          *9317
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*9318   377          1          -.370924E+04          *9319
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*9320   379          1          0.111069E+03          *9321
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*9322   381          1          0.664130E+01          *9323
*9323   382          1          0.991842E-01          *9324
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*9325   384          1          0.149748E+07
DMIG    *VTAIL       385        1                     *9326
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*9327   358          1          0.285959E+03          *9328
*9328   359          1          -.443238E+03          *9329
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*9334   367          1          0.952642E+02          *9335
*9335   368          1          0.256148E+03          *9336
*9336   369          1          0.903557E+03          *9337
*9337   370          1          0.597779E+03          *9338
*9338   371          1          0.124134E+03          *9339
*9339   372          1          -.470681E+01          *9340
*9340   373          1          -.373270E+00          *9341
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*9346   380          1          0.268160E+01          *9347
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*9349   383          1          -.714582E-02          *9350
*9350   384          1          -.269212E+04          *9351

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DMIG    *VTAIL       386        1                     *9352
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*9355   360          1          -.359483E+03          *9356
*9356   361          1          0.606719E+04          *9357
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*9359   364          1          0.195964E+02          *9360
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*9366   373          1          0.160192E+02          *9367
*9367   375          1          0.323717E+03          *9368
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*9371   379          1          -.689858E+03          *9372
*9372   380          1          0.423422E+01          *9373
*9373   381          1          0.102897E+02          *9374
*9374   382          1          0.527408E+00          *9375
*9375   383          1          0.337155E-01          *9376
*9376   384          1          0.643374E+03          *9377
*9377   385          1          -.357044E+04          *9378
*9378   386          1          0.322247E+05
DMIG    *VTAIL       387        1                     *9379
*9379   357          1          -.338835E+00          *9380
*9380   358          1          -.546516E-01          *9381
*9381   359          1          0.188194E+00          *9382
*9382   360          1          0.399533E-01          *9383
*9383   361          1          0.777587E-02          *9384
*9384   362          1          -.905881E-03          *9385
*9385   363          1          0.475235E-04          *9386
*9386   364          1          0.368288E-04          *9387
*9387   367          1          -.149039E-01          *9388
*9388   368          1          0.885053E-01          *9389
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*9391   371          1          -.849053E-03          *9392
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*9393   373          1          0.977434E-05          *9394
*9394   375          1          -.960622E+02          *9395
*9395   376          1          0.984160E+00          *9396
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*9401   382          1          -.608804E-07          *9402
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*9403   384          1          -.178513E+03          *9404
*9404   385          1          0.105938E+04          *9405
*9405   386          1          -.419783E+04          *9406
*9406   387          1          0.497765E+04
DMIG    *VTAIL       388        1                     *9407
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*9408   358          1          -.883404E-01          *9409
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*9411   361          1          0.502871E+02          *9412
*9412   362          1          0.250159E+03          *9413
*9413   363          1          0.874634E+04          *9414
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*9425   378          1          -.225652E+02          *9426
*9426   379          1          -.362756E+03          *9427
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*9429   382          1          -.303660E+04          *9430
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*9433   386          1          0.590076E+03          *9434
*9434   387          1          -.160275E+04          *9435
*9435   388          1          0.483130E+05
DMIG    *VTAIL       389        1                     *9436
*9436   357          1          0.103213E+02          *9437
*9437   358          1          0.166475E+01          *9438
*9438   359          1          -.573260E+01          *9439
*9439   360          1          -.121702E+01          *9440
*9440   361          1          -.236861E+00          *9441
*9441   362          1          0.275941E-01          *9442
*9442   363          1          -.144762E-02          *9443
*9443   364          1          -.112184E-02          *9444
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*9460   384          1          -.237751E+04          *9461
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*9475   390          1          -.160803E+04                    *9476
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DMIG    *VTAIL       392        1                               *9477
*9477   386          1          0.123460E+04                    *9478
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*9480   389          1          -.270690E+02                    *9481
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*9482   391          1          -.161773E+04                    *9483
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DMIG    *VTAIL       393        1                               *9484
*9484   387          1          0.571031E+03                    *9485
*9485   388          1          -.673689E+03                    *9486
*9486   389          1          0.223540E+01                    *9487
*9487   390          1          -.993771E+01                    *9488
*9488   391          1          0.711305E+02                    *9489
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DMIG    *VTAIL       406        1                               *9491
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*9492   358          1          -.280045E+04                    *9493
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*9494   360          1          0.204728E+04                    *9495
*9495   361          1          0.398450E+03                    *9496
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*9497   363          1          0.243519E+01                    *9498
*9498   364          1          0.188718E+01                    *9499
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*9500   368          1          0.453518E+04                    *9501
*9501   369          1          0.344413E+04                    *9502
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*9504   372          1          0.407663E+01                    *9505
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*9506   375          1          -.443406E+06                    *9507
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*9508   377          1          0.246556E+04                    *9509
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*9517   386          1          -.358031E+03                    *9518
*9518   387          1          0.100278E+03                    *9519
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*9520   389          1          -.305457E+04                    *9521
*9521   406          1          0.176490E+07
DMIG    *VTAIL       407        1                               *9554
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*9557   360          1          -.841305E+02                    *9558
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DMIG    *VTAIL       407        5                               *9522
*9522   357          1          0.191080E+06                    *9523
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*9524   359          1          -.280960E+05                    *9525
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*9545   383          1          0.517604E-02                    *9546
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*9589   359          1          -.413376E+03                    *9590
*9590   360          1          -.877589E+02                    *9591
*9591   361          1          -.170800E+02                    *9592
*9592   362          1          0.198980E+01                    *9593
*9593   363          1          -.104387E+00                    *9594
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*9603   376          1          -.216175E+04                    *9604
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*9614   387          1          0.145153E+02                    *9615
*9615   388          1          -.144600E+01                    *9616
*9616   389          1          -.442150E+03                    *9617
*9617   406          1          -.361694E+06                    *9618
*9618   407          5          -.565555E+03                    *9619
*9619   407          1          0.834648E+02                    *9620
*9620   408          1          0.109547E+06
DMIG    *VTAIL       409        1                               *9656
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*9659   360          1          0.293531E+03                    *9660
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*9665   368          1          0.215706E+04                    *9666
*9666   369          1          0.503979E+03                    *9667
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*9687   407          5          0.438355E+05                    *9688
*9688   407          1          0.785184E+04                    *9689
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*9690   409          5          0.179613E+06                    *9691
*9691   409          1          0.431661E+05
DMIG    *VTAIL       409        5                               *9621
*9621   357          1          -.108056E+06                    *9622
*9622   358          1          -.369272E+04                    *9623
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*9630   368          1          -.153980E+05                    *9631
*9631   369          1          -.392419E+04                    *9632
*9632   370          1          -.182427E+03                    *9633
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*9635   373          1          -.241942E+00                    *9636
*9636   375          1          -.145521E+06                    *9637
*9637   376          1          -.194645E+04                    *9638
*9638   377          1          -.813680E+03                    *9639
*9639   378          1          0.145115E+03                    *9640
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*9648   387                1                 0.503546E+01
*9649   388                1                -.432889E+00
*9650   389                1                -.153385E+03
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GRID    3082    0       -157.   -371.56 -11.46  0
GRID    3083    0       -157.   -375.72 -11.46  0
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GRID    3085    0       -157.   -391.1  -11.46  0
GRID    3086    0       -157.   -293.8  -17.75  0
GRID    3087    0       -157.   -336.72 -17.75  0
GRID    3088    0       -157.   -354.52 -17.75  0
GRID    3089    0       -157.   -367.16 -17.75  0
GRID    3090    0       -157.   -391.1  -17.75  0
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GRID    3092    0       -158.1  -381.56 0.      0
GRID    3093    0       -158.1  -371.56 -11.46  0
GRID    3094    0       -158.1  -381.56 -11.46  0
GRID    3095    0       -155.9  -371.56 0.      0
GRID    3096    0       -155.9  -381.56 0.      0
GRID    3097    0       -155.9  -371.56 -11.46  0
GRID    3098    0       -155.9  -381.56 -11.46  0
GRID    3196    0       -79.0   -315.2360.      0
GRID    3197    0       -63.0   -312.3620.      0
GRID    3198    0       -79.0   -331.2360.      0
GRID    3199    0       -63.0   -328.3620.      0
GRID    3200    0       -79.0   -316.87 0.      0
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GRID    3202    0       -63.0   -316.87 0.      0
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GRID    3206    0       -71.0   -325.4  -10.0   0
GRID    3207    0       -71.0   -325.4  -17.5   0
GRID    3208    0       -71.0   -312.6  -17.5   0
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GRID    3211    0       -71.0   -302.58 -30.5   0
GRID    3212    0       -71.0   -312.6  -30.5   0
GRID    3213    0       -71.0   -340.5  -30.5   0
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GRID    3501    0       -120.   -346.07 -11.20
MAT1    1       10.5E6  5.53E6
MAT1    2       10.5E6  4.0E6
MAT1    3       .99999E8.99999E8
MAT1    4       10.5E6  .99999E8
MAT1    5       10.5E6  4.400E6
MAT1    601     3.150E6 4.400E6
MAT1    606     6.825E6 4.400E6
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MAT2    703     6618000.2464000.-254500.8980000.-254500.2625000.
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MAT2    705     6047000.2622000.-109000.9502000.-109000.2783000.
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MAT2    708     6516000.2481000.-178900.9219000.-178900.2700000.
MAT2    709     6299000.2424000.-149500.9651000.-149500.2700000.
MAT2    710     6427000.2319000.-413300.9734000.-413300.2800000.
PARAM   GRDPNT  0
PARAM   WTMASS  0.00258
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+2401                                                           +2401A
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PBAR    2402    2       100.0   100.0   .00001  .001            +2402
+2402                                                           +2402A
+2402A  1.      .0000001
PBAR    2403    2       100.0   100.0   .00001  .001            +2403
+2403                                                           +2403A
+2403A  1.      .0000001
PBAR    2404    2       100.0   100.0   .00001  .001            +2404
+2404                                                           +2404A
+2404A  1.      .0000001
PBAR    2405    2       100.0   100.0   .00001  .001            +2405
+2405                                                           +2405A
+2405A  1.      .0000001
PBAR    2406    2       100.0   100.0   .00001  .001            +2406
+2406                                                           +2406A
+2406A  1.      .0000001
PBAR    2407    2       100.0   100.0   .00001  .001            +2407
+2407                                                           +2407A
+2407A  1.      .0000001
PBAR    2408    2       100.0   100.0   .00001  .001            +2408
+2408                                                           +2408A
+2408A  1.      .0000001
PBAR    2409    2       100.0   100.0   .00001  .001            +2409
+2409                                                           +2409A
+2409A  1.      .0000001
PBAR    2410    2       100.0   100.0   .00001  .001            +2410
+2410                                                           +2410A
+2410A  1.      .0000001
PBAR    2411    2       100.0   100.0   .00001  .001            +2411
+2411                                                           +2411A
+2411A  1.      .0000001
PBAR    2412    2       100.0   100.0   .00001  .001            +2412
+2412                                                           +2412A
+2412A  1.      .0000001
PBAR    2413    2       100.0   100.0   .00001  .001            +2413
+2413                                                           +2413A
+2413A  1.      .0000001
PBAR    2414    2       100.0   100.0   .00001  .001            +2414
+2414                                                           +2414A
+2414A  1.      .0000001
PBAR    2415    2       100.0   100.0   .00001  .001            +2415
+2415                                                           +2415A
+2415A  1.      .0000001
PBAR    2416    2       100.0   100.0   .00001  .001            +2416
+2416                                                           +2416A
+2416A  1.      .0000001
PBAR    2417    2       100.0   100.0   .00001  .001            +2417
+2417                                                           +2417A
+2417A  1.      .0000001
PBAR    2418    2       100.0   100.0   .00001  .001            +2418
+2418                                                           +2418A
+2418A  1.      .0000001
PBAR    2419    2       100.0   100.0   .00001  .001            +2419
+2419                                                           +2419A
+2419A  1.      .0000001
PBAR    2420    2       100.0   100.0   .00001  .001            +2420
+2420                                                           +2420A
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PBAR    2421    2       100.0   100.0   .00001  .001            +2421
+2421                                                           +2421A
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PBAR    2424    2       100.0   100.0   .00001  .001            +2424
+2424                                                           +2424A
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PBAR    2428    2       100.0   100.0   .00001  .001            +2428
+2428                                                           +2428A
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PBAR    2429    2       100.0   100.0   .00001  .001            +2429
+2429                                                           +2429A
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PBAR    2430    2       100.0   100.0   .00001  .001            +2430
+2430                                                           +2430A
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PBAR    2431    2       100.0   100.0   .00001  .001            +2431
+2431                                                           +2431A
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PBAR    2432    2       100.0   100.0   .00001  .001            +2432
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+2433                                                           +2433A
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+2434                                                           +2434A
+2434A  1.      .0000001
PBAR    2435    2       100.0   100.0   .00001  .001            +2435
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PBAR    2437    2       100.0   100.0   .00001  .001            +2437
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PBAR    2439    2       100.0   100.0   .00001  .001            +2439
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PBAR    2440    2       100.0   100.0   .00001  .001            +2440
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PBAR    2442    2       100.0   100.0   .00001  .001            +2442
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PBAR    2443    2       100.0   100.0   .00001  .001            +2443
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+2443A  1.      .0000001
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PBAR    2445    2       100.0   100.0   .00001  .001            +2445
+2445                                                           +2445A
+2445A  1.      .0000001
PBAR    2446    2       100.0   100.0   .00001  .001            +2446
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PBAR    2447    2       100.0   100.0   .00001  .001            +2447
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PBAR    2448    2       100.0   100.0   .00001  .001            +2448
+2448                                                           +2448A
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PBAR    2449    2       100.0   100.0   .00001  .001            +2449
+2449                                                           +2449A
+2449A  1.      .0000001
PBAR    2450    2       100.0   100.0   .00001  .001            +2450
+2450                                                           +2450A
+2450A  1.      .0000001
PBAR    2451    2       100.0   100.0   .00001  .001            +2451
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PBAR    2454    2       100.0   100.0   .00001  .001                    +2454
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PBAR    2455    2       100.0   100.0   .00001  .001                    +2455
+2455                                                                   +2455A
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PBAR    2456    2       100.0   100.0   .00001  .001                    +2456
+2456                                                                   +2456A
+2456A  1.      .0000001
PBAR    2457    2       100.0   100.0   .00001  .001                    +2457
+2457                                                                   +2457A
+2457A  1.      .0000001
PBAR    2458    2       100.0   100.0   .00001  .001                    +2458
+2458                                                                   +2458A
+2458A  1.      .0000001
PBAR    2459    2       100.0   100.0   .00001  .001                    +2459
+2459                                                                   +2459A
+2459A  1.      .0000001
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+1      NO      1.0             593.000 547.400                         +1A
+1A     0.      1.
PBEAM   2       2       .690    593.000 547.400         .001            +2
+2      NO      1.0             736.000 606.050                         +2A
+2A     0.      1.
PBEAM   3       2       4.140   896.000 655.500         640.            +3
+3      NO      1.0             912.000 656.500                         +3A
+3A     0.      1.
PBEAM   4       2       4.140   912.000 656.500         2175.           +4
+4      NO      1.0             3104.0001780.000                        +4A
+4A     0.      1.
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PBEAM   6       2       3.600   8000.0004245.000        5250.           +6
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+7A     0.      1.
PBEAM   8       2               1980.0008100.0004170.000        5250.   +8
+8      NO      1.0             9400.0003900.000                        +8A
+8A     0.      1.
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+9      NO      1.0             9400.0003887.062                        +9A
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+14A    0.      1.
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+16     NO      1.0             6425.0001872.000                        +16A
+16A    0.      1.
PBEAM   17      2               1980.0006425.0  1872.00         4910.0  +17
+17     NO      1.0             1980.0006375.0  1791.00                 +17A
+17A    0.      1.                      .0000
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+18A    0.      1.                      .0000
PBEAM   19      2               1980.0006200.0  1470.00         4515.0  +19
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+19A    0.      1.                      .0000
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+20A    0.      1.                      .0000
PBEAM   21      2               1980.0008250.0  1167.00         4147.5  +21
+21     NO      1.0             1980.0008250.0  960.00                  +21A
+21A    0.      1.                      .0000
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+22A    0.      0.
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+32     NO      1.0             200.000
PBEAM   33      2               200.000 9999.0  99999.00        .01     +33
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+37     NO      1.0             1188.000
PBEAM   38      2               1.970   9999.0  251.45          .01     +38
+38     NO      1.0             .950            49.35
PBEAM   39      2               4.140   9999.0  323.80                  +39
+39     NO      1.0             2.140           123.20
PBEAM   40      2               4.140   9999.0  284.10                  +40
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+41     NO      1.0             2.834           124.70
PBEAM   42      2               3.942   9999.0  379.30                  +42
+42     NO      1.0             2.088           112.40
PBEAM   43      2               2.886   9999.0  350.15                  +43
+43     NO      1.0             2.340           293.75
PBEAM   44      2               2.340   9999.0  293.75                  +44
+44     NO      1.0             1.430           99.875
PBEAM   45      2               1.430   9999.0  99.875          .001    +45
+45     NO      1.0             1.521           76.375
PBEAM   46      2               2.250   9999.0  215.00          .001    +46
+46     NO      1.0             2.250           162.00
PBEAM   47      2               2.250   9999.0  162.00                  +47
+47     NO      1.0             1.875           133.00
PBEAM   48      2               1.875   9999.0  133.00                  +48
+48     NO      1.0             2.250           46.00
PBEAM   49      2               1.256   1.      41.26           .001    +49
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+49A    0.      1.                      -.1188
PBEAM   50      2               1.354   1.      51.57                   +50
+50     NO      1.0             1.371           53.59                   +50A
+50A    0.      1.                      -.0185
PBEAM   51      2               1.371   1.      53.59                   +51
+51     NO      1.0             1.371           53.59                   +51A
+51A    0.      1.                      .0000
PBEAM   52      2               1.371   1.      53.59                   +52
+52     NO      1.0             1.534           60.14                   +52A
+52A    0.      1.                      -.0622
PBEAM   53      2               1.534   1.      60.14           .001    +53
+53     NO      1.0             1.547           62.03                   +53A
+53A    0.      1.                      -.0086
PBEAM   54      2               .942    1.      37.54           .001    +54
+54     NO      1.0             1.449           76.22                   +54A
+54A    0.      1.                      -.4242
PBEAM   55      2               1089.0001.      9999.00         .001    +55
+55     NO      1.0             1980.000        9999.00                 +55A
+55A    0.      1.                      .0000
PBEAM   56      2               1980.0001.      9999.00         .001    +56
+56     NO      1.0             1485.000        9999.00                 +56A
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PBEAM   57      2               1.440   .001    .001            .001    +57
+57     NO      1.0             1.440                                   +57A
+57A    0.      1.                      .0000
PBEAM   141     2               2.380   1.      46.34           .001    +141
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+141A   0.      1.                      -.0571
PBEAM   142     2               2.520   1.      52.89           .001    +142
+142    NO      1.0             2.660           60.54                   +142A
+142A   0.      1.                      -.0541
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+143    NO      1.0             2.800           61.49                   +143A
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+146A   0.      1.                      -.0269
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+1119A	0.	1.		.117		
PBEAM	1120	2	0.31416	1.	1.796	+1120
+1120	NO	1.	0.27047		1.622	+1120A
+1120A	0.	1.		.149		
PBEAM	1121	2	0.36593	1.	.570	+1121
+1121	NO	1.	0.32453		.448	+1121A
+1121A	0.	1.		.120		
PBEAM	1122	2	0.23987	1.	.388	+1122
+1122	NO	1.	0.2193		.324	+1122A
+1122A	0.	1.		8.96-2		
PBEAM	1123	2	2.193	1.	0.577	+1123
+1123	NO	1.	1.7255		0.319	+1123A
+1123A	0.	1.		.239		
PBEAM	1124	2	1.7255	.1	0.319	+1124
+1124	NO	1.	1.411		0.186	+1124A
+1124A	0.	1.		.201		
PBEAM	1125	2	1.411	1.	0.186	+1125
+1125	NO	1.	1.122		0.37	+1125A
+1125A	0.	1.		.228		
PBEAM	1126	2	0.290	1.	.15	+1126
+1126	NO	1.	0.230			+1126A
+1126A	0.	1.		.231		
PBEAM	1127	2	0.230	1.	.15	+1127
+1127	NO	1.	0.180			+1127A
+1127A	0.	1.		.244		
PBEAM	1128	2	0.180	1.	.15	+1128
+1128	NO	1.	0.150			+1128A
+1128A	0.	1.		.182		
PBEAM	1131	2	24.900	1.	2.334	+1131
+1131	NO	1.0	41.600		4.497	+1131A
+1131A	0.	1.		-.502		
PBEAM	1132	2	22.300	1.	1.258	+1132
+1132	NO	1.0	43.800		6.091	+1132A
+1132A	0.	1.		-.651		
PBEAM	1133	2	43.800	1.	6.091	.001 +1133
+1133	NO	1.0	46.400		8.843	+1133A
+1133A	0.	1.		-.058		
PBEAM	1134	2	46.4	100.	13.5	10. +1134
+1134	NO	1.	50.68			+1134A
+1134A	0.	1.		-8.82-2		
PBEAM	1135	2	20.300	1.	1.601	+1135
+1135	NO	1.0	39.600		5.214	+1135A
+1135A	0.	1.		-.644		
PBEAM	1136	2	17.900	1.	1.469	+1136
+1136	NO	1.0	35.300		4.849	+1136A
+1136A	0.	1.		-.654		
PBEAM	1137	2	35.300	1.	4.849	.001 +1137
+1137	NO	1.0	39.910		7.360	+1137A
+1137A	0.	1.		-.123		
PBEAM	1138	2	39.91	100.	10.5	10. +1138
+1138	NO	1.	40.37			+1138A
+1138A	0.	1.		-1.15-2		
PBEAM	1139	2	15.900	1.	1.286	+1139
+1139	NO	1.0	31.800		4.283	+1139A
+1139A	0.	1.		-.667		
PBEAM	1140	2	14.000	1.	.836	+1140
+1140	NO	1.0	28.200		2.827	+1140A
+1140A	0.	1.		-.673		
PBEAM	1141	2	28.200	1.	2.827	.001 +1141
+1141	NO	1.0	32.160		4.634	+1141A
+1141A	0.	1.		-.131		
PBEAM	1142	2	32.16	100.	7.94	10. +1142
+1142	NO	1.	32.70			+1142A
+1142A	0.	1.		-1.67-2		
PBEAM	1143	2	12.800	1.	.537	+1143
+1143	NO	1.0	26.050		1.860	+1143A
+1143A	0.	1.		-.682		
PBEAM	1144	2	11.190	1.	.541	+1144
+1144	NO	1.0	23.000		1.894	+1144A
+1144A	0.	1.		-.691		
PBEAM	1145	2	23.000	1.	1.894	.001 +1145
+1145	NO	1.0	25.560		3.414	+1145A
+1145A	0.	1.		-.105		
PBEAM	1146	2	25.56	100.	6.5	10. +1146
+1146	NO	1.	27.16			+1146A
+1146A	0.	1.		-6.070-2		
PBEAM	1147	2	9.060	1.	.492	+1147
+1147	NO	1.0	19.800		1.700	+1147A
+1147A	0.	1.		-.744		
PBEAM	1148	2	7.640	1.	.210	+1148
+1148	NO	1.0	17.500		.929	+1148A
+1148A	0.	1.		-.784		
PBEAM	1149	2	17.500	1.	.929	.001 +1149
+1149	NO	1.0	18.620		1.942	+1149A
+1149A	0.	1.		-.062		
PBEAM	1150	2	18.62	100.	4.32	10. +1150
+1150	NO	1.	19.3			+1150A
+1150A	0.	1.		-3.59-2		
PBEAM	1151	2	7.100	1.	.042	+1151
+1151	NO	1.0	16.900		.269	+1151A
+1151A	0.	1.		-.817		
PBEAM	1152	2	22.300	1.	1.150	+1152
+1152	NO	1.0	24.900		1.440	+1152A
+1152A	0.	1.		-.110		
PBEAM	1153	2	20.300	1.	.870	+1153
+1153	NO	1.0	22.300		1.150	+1153A
+1153A	0.	1.		-.094		
PBEAM	1154	2	17.900	1.	.630	+1154
+1154	NO	1.0	20.300		.870	+1154A
+1154A	0.	1.		-.126		
PBEAM	1155	2	15.900	1.	.470	+1155
+1155	NO	1.0	17.900		.630	+1155A
+1155A	0.	1.		-.118		
PBEAM	1156	2	14.000	1.	.340	+1156
+1156	NO	1.0	15.900		.470	+1156A
+1156A	0.	1.		-.127		
PBEAM	1157	2	12.800	1.	.260	+1157
+1157	NO	1.0	14.000		.340	+1157A
+1157A	0.	1.		-.090		
PBEAM	1158	2	11.190	1.	.280	+1158
+1158	NO	1.0	12.800		.260	+1158A
+1158A	0.	1.		-.134		
PBEAM	1159	2	9.060	1.	.260	+1159

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+1159   NO    1.0    11.190          .280                          +1159A
+1159A  0.    1.                  -.210
PBEAM   1160  2      7.640   1.      .170                          +1160
+1160   NO    1.0    9.060           .260                          +1160A
+1160A  0.    1.                  -.170
PBEAM   1161  2      7.100   1.      .120                          +1161
+1161   NO    1.0    7.640           .170                          +1161A
+1161A  0.    1.                  -.073
PBEAM   1162  2      43.800  1.      5.189                         +1162
+1162   NO    1.0    41.600          5.636                         +1162A
+1162A  0.    1.                  .052
PBEAM   1163  2      39.600  1.      4.049                         +1163
+1163   NO    1.0    43.800          5.170                         +1163A
+1163A  0.    1.                  -.101
PBEAM   1164  2      35.300  1.      3.053                         +1164
+1164   NO    1.0    39.600          4.049                         +1164A
+1164A  0.    1.                  -.115
PBEAM   1165  2      31.800  1.      2.364                         +1165
+1165   NO    1.0    35.300          3.040                         +1165A
+1165A  0.    1.                  -.104
PBEAM   1166  2      28.200  1.      1.762                         +1166
+1166   NO    1.0    31.800          2.354                         +1166A
+1166A  0.    1.                  -.120
PBEAM   1167  2      26.050  1.      1.444                         +1167
+1167   NO    1.0    28.200          1.754                         +1167A
+1167A  0.    1.                  -.079
PBEAM   1168  2      23.000  1.      1.274                         +1168
+1168   NO    1.0    26.050          1.431                         +1168A
+1168A  0.    1.                  -.124
PBEAM   1169  2      19.800  1.      1.019                         +1169
+1169   NO    1.0    23.000          1.269                         +1169A
+1169A  0.    1.                  -.150
PBEAM   1170  2      17.500  1.      .706                          +1170
+1170   NO    1.0    19.800          1.007                         +1170A
+1170A  0.    1.                  -.123
PBEAM   1171  2      16.900  1.      .588                          +1171
+1171   NO    1.0    17.500          .709                          +1171A
+1171A  0.    1.                  -.035
PBEAM   1181  2      0.341   100.    4.328           .001          +1181
+1181   NO    1.     1.0025          10.953                        +1181A
+1181A  0.    1.                  -.984
PBEAM   1182  2      1.604   1.      75.00000        .265          +1182
+1182   NO    1.0    1.365           70.00000                      +1182A
+1182A  0.    1.                  .1611
PBEAM   1183  2      68.240  1.      70.00000        .265          +1183
+1183   NO    1.0    53.180          18.30000                      +1183A
+1183A  0.    1.                  .2481
PBEAM   1184  2      1.064   1.      18.30000        .265          +1184
+1184   NO    1.0    .715            5.30000                       +1184A
+1184A  0.    1.                  .3923
PBEAM   1185  2      .715    1.      5.30000         .265          +1185
+1185   NO    1.0    .370            .65000                        +1185A
+1185A  0.    1.                  .6362
PBEAM   1186  2      22.130  1.      7.00000         .265          +1186
+1186   NO    1.0    21.000          7.00000                       +1186A
+1186A  0.    1.                  .0524
PBEAM   1187  2      21.000  1.      7.00000         .265          +1187
+1187   NO    1.0    16.200          .95000                        +1187A
+1187A  0.    1.                  .2581
PBEAM   1188  2      16.200  1.      .95000          .265          +1188
+1188   NO    1.0    10.900          .30000                        +1188A
+1188A  0.    1.                  .3911
PBEAM   1189  2      10.900  1.      .30000          .265          +1189
+1189   NO    1.0    5.690           .04000                        +1189A
+1189A  0.    1.                  .6281
PBEAM   1190  2      3.414   100.    1.1             .001          +1190
+1190   NO    1.     2.802           1.0                           +1190A
+1190A  0.    1.                  .197
PBEAM   1191  2      18.680  1.      5.80000         .265          +1191
+1191   NO    1.0    18.680          5.80000                       +1191A
+1191A  0.    1.                  .0000
PBEAM   1192  2      18.680  1.      5.80000         .265          +1192
+1192   NO    1.0    14.740          .28300                        +1192A
+1192A  0.    1.                  .2358
PBEAM   1193  2      14.740  1.      .28300          .265          +1193
+1193   NO    1.0    9.990           .09600                        +1193A
+1193A  0.    1.                  .3841
PBEAM   1194  2      9.990   1.      .09600          .265          +1194
+1194   NO    1.0    5.250           .01400                        +1194A
+1194A  0.    1.                  .6220
PBEAM   1195  2      35.960  1.      5.14100         .265          +1195
+1195   NO    1.0    33.740          5.13000                       +1195A
+1195A  0.    1.                  .0637
PBEAM   1196  2      33.740  1.      5.13000         .265          +1196
+1196   NO    1.0    26.740          .22400                        +1196A
+1196A  0.    1.                  .2315
PBEAM   1197  2      26.740  1.      .22400          .265          +1197
+1197   NO    1.0    18.100          .07510                        +1197A
+1197A  0.    1.                  .3854
PBEAM   1198  2      18.100  1.      .07510          .265          +1198
+1198   NO    1.0    9.500           .01143                        +1198A
+1198A  0.    1.                  .6232
PBEAM   1199  2      0.924   100.    0.32            .001          +1199
+1199   NO    1.     0.7535          0.25                          +1199A
+1199A  0.    1.                  .203
PBEAM   1200  2      15.070  1.      3.20000         .265          +1200
+1200   NO    1.0    15.070          3.20000                       +1200A
+1200A  0.    1.                  .0000
PBEAM   1201  2      15.070  1.      3.20000         .265          +1201
+1201   NO    1.0    13.370          .17300                        +1201A
+1201A  0.    1.                  .1195
PBEAM   1202  2      13.370  1.      .17300          .265          +1202
+1202   NO    1.0    8.120           .05600                        +1202A
+1202A  0.    1.                  .4886
PBEAM   1203  2      8.120   1.      .05600          .265          +1203
+1203   NO    1.0    4.260           .00880                        +1203A
+1203A  0.    1.                  .6236
PBEAM   1204  2      15.940  1.      2.00000         .265          +1204
+1204   NO    1.0    13.940          2.00000                       +1204A
+1204A  0.    1.                  .1339
PBEAM   1205  2      13.940  1.      2.00000         .265          +1205
+1205   NO    1.0    11.130          .10800                        +1205A
+1205A  0.    1.                  .2242
PBEAM   1206  2      11.130  1.      .10800          .265          +1206

+1206   NO    1.0    7.530           .03700                        +1206A
+1206A  0.    1.                  .3859
PBEAM   1207  2      7.530   1.      .03700          .265          +1207
+1207   NO    1.0    3.950           .00580                        +1207A
+1207A  0.    1.                  .6237
PBEAM   1208  2      12.820  1.      1.20000         .265          +1208
+1208   NO    1.0    12.820          1.20000                       +1208A
+1208A  0.    1.                  .0000
PBEAM   1209  2      12.820  1.      1.20000         .265          +1209
+1209   NO    1.0    10.280          .07100                        +1209A
+1209A  0.    1.                  .2199
PBEAM   1210  2      10.280  1.      .07100          .265          +1210
+1210   NO    1.0    6.960           .02500                        +1210A
+1210A  0.    1.                  .3852
PBEAM   1211  2      6.960   1.      .02500          .265          +1211
+1211   NO    1.0    3.640           .00370                        +1211A
+1211A  0.    1.                  .6264
PBEAM   1212  2      0.7055  100.    0.32            .001          +1212
+1212   NO    1.     0.63            0.25                          +1212A
+1212A  0.    1.                  .113
PBEAM   1213  2      12.600  1.      .70000          .265          +1213
+1213   NO    1.0    11.690          .70000                        +1213A
+1213A  0.    1.                  .0749
PBEAM   1214  2      11.690  1.      .70000          .265          +1214
+1214   NO    1.0    9.420           .05530                        +1214A
+1214A  0.    1.                  .2151
PBEAM   1215  2      9.420   1.      .05530          .265          +1215
+1215   NO    1.0    6.360           .01900                        +1215A
+1215A  0.    1.                  .3878
PBEAM   1216  2      6.360   1.      .01900          .265          +1216
+1216   NO    1.0    3.330           .00290                        +1216A
+1216A  0.    1.                  .6254
PBEAM   1217  2      11.400  1.      .40000          .265          +1217
+1217   NO    1.0    10.620          .40000                        +1217A
+1217A  0.    1.                  .0708
PBEAM   1218  2      10.620  1.      .40000          .265          +1218
+1218   NO    1.0    8.570           .01970                        +1218A
+1218A  0.    1.                  .2137
PBEAM   1219  2      8.570   1.      .01970          .265          +1219
+1219   NO    1.0    5.750           .00760                        +1219A
+1219A  0.    1.                  .3939
PBEAM   1220  2      5.750   1.      .00760          .265          +1220
+1220   NO    1.0    2.990           .00130                        +1220A
+1220A  0.    1.                  .6316
PBEAM   1231  2      .189    1.      2.20872         3.000         +1231
+1231   NO    1.0    .614            25.02095                      +1231A
+1231A  0.    1.                  -1.0587
PBEAM   1232  2      .280    1.      1.74280         2.000         +1232
+1232   NO    1.0    .315            2.20872                       +1232A
+1232A  0.    1.                  -.1169
PBEAM   1233  2      .152    1.      1.15839         .900          +1233
+1233   NO    1.0    .168            1.42177                       +1233A
+1233A  0.    1.                  -.1018
PBEAM   1234  2      .226    1.      .74641          .700          +1234
+1234   NO    1.0    .253            .93783                        +1234A
+1234A  0.    1.                  -.1127
PBEAM   1235  2      .125    1.      .55802          .400          +1235
+1235   NO    1.0    .136            .65330                        +1235A
+1235A  0.    1.                  -.0779
PBEAM   1236  2      .115    1.      .40738          .300          +1236
+1236   NO    1.0    .125            .48321                        +1236A
+1236A  0.    1.                  -.0837
PBEAM   1237  2      .175    1.      .28956          .150          +1237
+1237   NO    1.0    .192            .34903                        +1237A
+1237A  0.    1.                  -.0922
PBEAM   1238  2      .096    1.      .20137          .075          +1238
+1238   NO    1.0    .105            .24515                        +1238A
+1238A  0.    1.                  -.0959
PBEAM   1241  2      16.200  1.      .01850          3.000         +1241
+1241   NO    1.0    53.180          .26000                        +1241A
+1241A  0.    1.                  -1.0660
PBEAM   1242  2      14.740  1.      .01400          2.000         +1242
+1242   NO    1.0    16.200          .01850                        +1242A
+1242A  0.    1.                  -.0944
PBEAM   1243  2      13.370  1.      .00940          .900          +1243
+1243   NO    1.0    14.740          .01400                        +1243A
+1243A  0.    1.                  -.0975
PBEAM   1244  2      13.370  1.      .00690          .700          +1244
+1244   NO    1.0    13.370          .00940                        +1244A
+1244A  0.    1.                  .0000
PBEAM   1245  2      11.130  1.      .00450          .400          +1245
+1245   NO    1.0    13.370          .00690                        +1245A
+1245A  0.    1.                  -.1829
PBEAM   1246  2      10.280  1.      .00330          .300          +1246
+1246   NO    1.0    11.130          .00450                        +1246A
+1246A  0.    1.                  -.0794
PBEAM   1247  2      9.420   1.      .00210          .150          +1247
+1247   NO    1.0    10.280          .00330                        +1247A
+1247A  0.    1.                  -.0873
PBEAM   1248  2      8.570   1.      .00150          .075          +1248
+1248   NO    1.0    9.420           .00210                        +1248A
+1248A  0.    1.                  -.0945
PBEAM   1251  2      10.900  1.      .00604          3.000         +1251
+1251   NO    1.0    35.740          .08200                        +1251A
+1251A  0.    1.                  -1.0652
PBEAM   1252  2      9.990   1.      .00460          2.000         +1252
+1252   NO    1.0    10.900          .00604                        +1252A
+1252A  0.    1.                  -.0871
PBEAM   1253  2      9.050   1.      .00315          .900          +1253
+1253   NO    1.0    9.990           .00460                        +1253A
+1253A  0.    1.                  -.0987
PBEAM   1254  2      8.120   1.      .00232          .700          +1254
+1254   NO    1.0    9.050           .00315                        +1254A
+1254A  0.    1.                  -.1083
PBEAM   1255  2      7.530   1.      .00149          .400          +1255
+1255   NO    1.0    8.120           .00232                        +1255A
+1255A  0.    1.                  -.0754
PBEAM   1256  2      6.960   1.      .00112          .300          +1256
+1256   NO    1.0    7.530           .00149                        +1256A
+1256A  0.    1.                  -.0787
PBEAM   1257  2      6.360   1.      .00074          .150          +1257
+1257   NO    1.0    6.960           .00112                        +1257A
+1257A  0.    1.                  -.0901
PBEAM   1258  2      5.750   1.      .00049          .075          +1258
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+1258   NO      1.0     6.360           .00074                          +1258A
+1258A  0.      1.              -.1007
PBEAM   1261    2       5.690   1.      .00089          3.000           +1261
+1261   NO      1.0     18.490          .01210                          +1261A
+1261A  0.      1.              -1.0587
PBEAM   1262    2       5.250   1.      .00068          2.000           +1262
+1262   NO      1.0     5.690           .00089                          +1262A
+1262A  0.      1.              -.0804
PBEAM   1263    2       4.750   1.      .00047          .900            +1263
+1263   NO      1.0     5.250           .00068                          +1263A
+1263A  0.      1.              -.1000
PBEAM   1264    2       4.260   1.      .00035          .700            +1264
+1264   NO      1.0     4.750           .00047                          +1264A
+1264A  0.      1.              -.1088
PBEAM   1265    2       3.950   1.      .00023          .400            +1265
+1265   NO      1.0     4.260           .00035                          +1265A
+1265A  0.      1.              -.0755
PBEAM   1266    2       3.640   1.      .00017          .300            +1266
+1266   NO      1.0     3.950           .00023                          +1266A
+1266A  0.      1.              -.0817
PBEAM   1267    2       3.330   1.      .00011          .150            +1267
+1267   NO      1.0     3.640           .00017                          +1267A
+1267A  0.      1.              -.0890
PBEAM   1268    2       2.990   1.      .00008          .075            +1268
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RBAR    3170    3077    3095    123456                  123
RBAR    3171    3078    3096    123456                  123
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SPC1    3       1       368     369     370     371     373     381
SPC1    3       1       383     384     385     386     387     389
SPC1    3       1       390     391     392     393     408
SPC1    3       156     36      42      50      437     59      431
SPC1    3       156     71      84      298     286     117     285
SPC1    3       156     163     164     153     154     155     156
SPC1    3       156     267     268     458     459
SPC1    3       156     283     284     282     281     405
SPC1    4       234     36      42      50      437     59      431
SPC1    4       234     71      84      298     286     117     285
SPC1    4       234     163     164     153     154     155     156
SPC1    4       234     267     268     458     459
SPC1    4       234     283     284     282     281     405
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SPC1    5       4       3077
SPC1    5       456     251     256     261     262     266
SPC1    5       456     1001    1002    1003    1004    1005    1006
SPC1    5       456     1007    1008    1010    1012    1014    1016
SPC1    5       456     1018    1173    1174    1175    1176    1177
SPC1    5       456     1019    THRU    1027
SPC1    5       456     1029    1030    1032    1033    1038    1039
SPC1    5       456     1031    1034    1037    1040    1045    1048
SPC1    5       456     1044    1046    1047    1051    1052    1053
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SPC1    5       456     1081    1085    1086    1087    1088
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SPC1    5       456     1096    1097    1098    1099    1100    1101
SPC1    5       456     1102    1103    1104    1105    1106    1107
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SPC1    5       456     1134    1135    1136    1137    1138    1139
SPC1    5       456     1140    1141    1142
SPC1    5       456     1143
SPC1    5       456     1178    1179    1180    1194
SPC1    5       456     1181    THRU    1193
SPC1    5       456     1233    2233
SPC1    5       456     1242    1243    1244    1245
SPC1    5       456     1251    THRU    1266
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SPC1    5       456     1501    THRU    1526
SPC1    5       456     2001    2002    2003    2004    2005    2006
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SPC1    5       456     2019    THRU    2027
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SPC1    5       456     2044    2046    2047    2051    2052    2053
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SPC1    5       456     2081    2085    2086    2087    2088
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SPC1    5       456     2096    2097    2098    2099    2100    2101
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SPC1    5       456     2108    2109    2110    2111    2112    2113
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SPC1    5       456     2140    2141    2142
SPC1    5       456     2143
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SPC1    5       456     2292    2293    2464    2465    2466    2467
SPC1    5       456     2501    THRU    2526
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SPC1    5       456     3095    3096    3097    3098
SPC1    5       123456  701     702     703
SPCADD  1       3       5
SPCADD  2       4       5
SUPORT  42      156
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